THE GAS JOURNAL

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A Glance at the Contents

Review of Statute and Case Law of 1931.

We publish a review to-day of Statute and Case Law of 1931 as applicable to gas undertakings. [p. 29.]

New Showrooms and Offices at Weston-super-Mare.

During the past twenty years the Weston-super-Mare Gaslight Company has doubled its sale of gas. To cope with the rapid expansion of business, the manufacturing plant has been brought to a high standard of efficiency; and the latest enterprise—new showrooms and offices—was inaugurated recently. The premises constitute an impressive feature of the architecture of the town. [p. 26.]

Mr. Forshaw Addresses Western Junior Association.

A meeting of the Western Junior Gas Association was held in the showroom of the Bath Gas Company on Saturday, Dec. 19, when Mr. A. Forshaw, of Messrs. R. & A. Main, Ltd., gave a lecture illustrated by lantern slides on "The Development of the Gas Fire." After tea, provided by the courtesy of the Bath Company, a discussion took place, and Mr. Forshaw was heartily thanked for his interesting lecture. [p. 36.]

Steaming in Continuous Verticals.

This was the subject of a paper presented at the Third International Conference on Bituminous Coal at the Carnegie Institute of Technology, Pittsburg, in November last, by M. Barash, Ph.D., M.Sc.Tech., F.I.C., and T. A. Tomlinson, M.B.E., M.I.Mech.E., M.Inst.Gas E., both of West's Gas Improvement Company, Ltd., of Manchester, an extract of which is published to-day. [p. 32.]

Time's Changes.

An article to-day reviews the changes effected in the carbonizing plant of the Croydon Gas Company from the days when Mr. J. W. Helps was Engineer, with illustrations depicting past and present conditions. A photograph, taken in 1893, shows the regenerative settings and manual charger, while the present Editor of the "JOURNAL" also appears in the picture. The article is relevant to the series of slides with which Mr. Walter Grogono, the present Engineer of the Company, illustrated his paper on Intermittent Vertical Chambers presented at the November meeting of the Southern Association. [p. 30.]

Forthcoming Engagements

Jan. 9.—SCOTTISH JUNIOR ASSOCIATION.—Joint Meeting in Edinburgh. Address by Mr. T. M. Ashford, Senior Smoke Inspector, Glasgow.

Jan. 9.—LONDON AND SOUTHERN DISTRICT JUNIOR ASSOCIATION.—Visit to the Home Office Museum, London.

Jan. 9.—WESTERN JUNIOR ASSOCIATION.—Meeting in Exeter. Paper by Mr. J. H. Dyde on "Coke in Relation to its Domestic Use."

Jan. 9.—SCOTTISH JUNIOR ASSOCIATION.—Joint Meeting in Edinburgh. Address by Mr. T. M. Ashford on atmospheric pollution.

Jan. 14.—MIDLAND JUNIOR ASSOCIATION.—Paper by Mr. J. C. Cotterill, of Worcester, on "Notes on Water Softening Plants."

Jan. 16.—YORKSHIRE JUNIOR ASSOCIATION.—Meeting in Leeds.

Jan. 20.—B.C.G.A.—Executive Committee Meeting, 11 a.m.

Jan. 20.—B.C.G.A.—General Committee Meeting, 2.30 p.m.

Jan. 23.—SCOTTISH JUNIOR ASSOCIATION (WESTERN DISTRICT).—Visit to Johnstone Gas-Works.

Jan. 27.—SOUTHERN ASSOCIATION (EASTERN DISTRICT).—Meeting at 28, Grosvenor Gardens, at 2.30 p.m.

Jan. 29.—LONDON AND SOUTHERN DISTRICT JUNIOR ASSOCIATION.—Meeting in London. Paper by Mr. Roy Summerson, "Exhausting and Governing Gas from Retorts."

Feb. 6.—MANCHESTER AND DISTRICT JUNIOR ASSOCIATION.—Visit to new works at Lostock Road, Preston. Paper on "Industrial Gas Furnaces" by Mr. G. H. Windiate, of Stretford.

1932 "JOURNAL" Directory.

Further Changes.

Page 69, TOTTENHAM. Price 8·6d. for 8·8d.

Page 80, BRIDGE OF WEIR. M. Campbell *vice* A. Cunningham, resigned.

EDITORIAL NOTES

Optimum Carbonization

TO-DAY we commence publication of an extract from a comprehensive and most valuable contribution to the technique of carbonization in modern continuous vertical retorts, this contribution being presented by Dr. Barash and Mr. Tomlinson, of West's Gas Improvement Company, Ltd., at the Third International Conference on Bituminous Coal, held in Pittsburg in November last. Not unnaturally their paper is concerned more particularly with the Glover-West system of continuous carbonization, but much of what the authors have to say is of general significance, and our readers—whether they be engineers and managers, chemists, or students—cannot fail to derive a great deal of benefit from its study. We regard it as of such practical importance that it is desirable to emphasize a few of the salient points.

In the first place, the authors summarize, in an exceptionally clear manner, the gas made at declared calorific values by authorized gas undertakings. The values for the vast majority of undertakings and the great bulk of gas supplied lie between 450 and 500 B.Th.U., and the single value which claims the greatest number of undertakings and the greatest bulk of gas is 500 B.Th.U. About 76 p.ct. of the gas supplied in and around London is sold at the declared calorific value of 500 B.Th.U.; no provincial undertaking of the first importance is supplying gas at more than 500 B.Th.U., and 50 p.ct. of the supply by the important provincial undertakings ranges from 470 to 480 B.Th.U. These figures demonstrate the influence of water gas dilution during the past fifteen years or so, and show the flexibility which gas undertakings enjoy in supplying gas at a calorific value best suited to their particular distribution systems. From time to time a standard calorific value throughout the country is advocated. This view, however, ignores one vital consideration—that a standard efficiency of operation at the gas appliance can be ensured irrespective of the calorific values normally supplied. The consumer is concerned solely about this standard service.

The gas undertaking, on the other hand, has to consider how to supply the standard service most economically, having regard to local circumstances; and there is no doubt whatever that in this connection the continuous vertical retort has in many instances alone made this possible. Consequently the authors devote the major portion of their paper to the production of water gas by steaming in the modern vertical retort. Their contention—amply backed-up by experimental figures on a working scale—is that for every increment of water gas dilution by steaming there is an optimum throughput of coal. To neglect this consideration is to reduce the efficiency of working. They criticize previous investigations, both in this country (by the Fuel Research Board) and in America (by L. J. Willien), on the legitimate grounds that the effect of steaming was studied while maintaining a constant throughput of coal per retort, instead of adjusting it at each calorific value for optimum yields per ton of coal and per retort. In practical working the water gas reaction demands a temperature of 1100° C. to 1200° C. in the coke inside the retort, and, to ensure this, temperatures of 1300° C. to 1400° C. in the combustion chambers; and in both the investigations mentioned the reaction temperature was too low for the successful production of water gas, and was successively dropping as the throughput of steam *plus* coal was increasing in the series of tests.

Optimum throughput of coal in relation to the amount of steam admitted to the retort, then, should be the aim of the carbonizer; and the authors indicate as a result of their work in Manchester that, from the point of view of gas-making, steaming under correct conditions represents an astonishingly true chemical reaction in which a very high efficiency can be obtained in industrial practice at any stage in the process at which it is desired to stop. They have translated their experimental work on steaming into an extremely valuable set of curves applicable to all types of coal. This chart, which will be reproduced in the "JOURNAL" next week, is an elaboration of a previous one, and it will be welcomed by our readers. It will afford a check on the correct adjustment of carbonizing conditions—heats, throughput, and/or steaming—on a setting of Glover-West continuous vertical retorts for any particular coal, working at any particular calorific value. We have touched only upon this one aspect of a remarkably useful contribution; other matters dealt with include the effect of steaming on the coke produced, and the fuel consumption necessary for the steaming process. On both these questions the authors have much helpful information to impart.

Horizontal Retorts

IN view of what we have said about the flexibility of the continuous vertical retort, it is interesting to turn to the results of two investigations recently carried out by the Fuel Research Board, and set out in the Report of the Board for the year ended March 31, 1931, which was published a couple of days ago. The horizontal setting at the Fuel Research Station, which was put to work in 1926 and at the end of March last had carbonized practically 15,000 tons of coal, is of normal design for a throughput of 10 tons of coal a day (combustion chamber temperature 1350° C.), except that arrangements were made for using water gas for heating when it was required to have precise measurements of the fuel used. We have already referred in the "JOURNAL" to the method adopted at the Station whereby, by increasing the volume of flue gases, the throughput could be increased from the normal 10 tons of coal a day up to nearly 15 tons, without raising the combustion chamber temperature above 1350° C. The report before us describes the experiments carried out during the year under review to see how much further the throughput could be increased. Using producer gas from the built-in producer, and increasing the volume of hot flue gas, a throughput of nearly 17 tons has been attained, and it does not yet appear that the limit of the setting has been reached.

To operate the system it is necessary to assist mechanically both the supply of air to the producer and the discharge of flue gases up the chimney, and in addition to use mechanical means for circulating the flue gases which return to the setting and enter with the secondary air. The total power used for supplying forced primary air and circulating flue gas amounts to 12-H.P. hours per ton of coal carbonized, or the equivalent of 16 lbs. of coke. The only marked difficulty which has arisen in operating the setting at the highest throughput is the attention which must be given to the offtake pipes, particularly those from the upper retorts; but this has largely been overcome by passing an auger down each pipe belonging to each retort just prior to discharging the coke. On the conclusion of certain tests now in hand at the Station it is proposed to renew the retorts, and at the same time to make certain alterations to the setting with a view to obtaining greater flexibility in the heating arrangements, with a consequent increase in possible throughput, and still greater flexibility in working. We regard the results already obtained as of the greatest importance, and look forward to the publication of the outcome of future work. Even with the setting as now arranged it is possible to increase the rate of throughput from 10 to 15 tons a day in the course of a few hours, and to 17 or more in the course of a day, with corresponding increase in the rate of gas making. "The flexibility of working thus obtained," states Dr. C. H. Lander, "is perhaps even more important than the reduction in capital costs and ground space resulting from the increased throughput."

The natural ally of the horizontal retort is the water

gas plant, and the report states that conditions, it is believed, have been established for any coke (depending on the melting point of its ash), and for any plant, under which water gas production can be carried out with no clinkering difficulties whatsoever, the ash and clinker crusts formed by the process being easily removed, either by hand at suitable intervals of time, or continuously by the provision of moving or rotating bars as a grate.

A Final Report

As many of our readers are aware, Dr. Lander's report is his last as Director of Fuel Research, as he has retired to take the Chair of Mechanical Engineering at the City and Guilds College, Imperial College of Science and Technology, University of London. At this juncture, therefore, it is fitting to refer to the career of one who has been of such help to our Industry and is such a popular figure at its gatherings. Prof. Lander, who was educated at the Modern School, Eccles, was apprenticed to the Manchester Ship Canal Company, and after further experience at various engineering works he took the Honours Course of Engineering at Manchester University, where he obtained the Degree of B.Sc., with First-Class Honours, and the Fairbairn Prize in 1905. From 1906 to 1919 he was demonstrator and then lecturer in engineering in the University of Manchester, and during the war he was first an officer in the University O.T.C., of which he was the Adjutant for some time, and later a Lieutenant, R.N.V.R., in which capacity he worked on the development of paravanes. When at Manchester he acted for some time as part-time engineer to the Home Office Humidity Committee.

He joined the staff of the Department of Scientific and Industrial Research in 1919, and was first employed as Engineering Technical Officer. He very shortly became assistant to Sir George Beilby, who was then Director of Fuel Research and Chairman of the Fuel Research Board, and in particular had charge of the Physical and Chemical Survey of the National Coal Resources, with the title of Superintendent. In 1922, when Sir George Beilby took a well-earned rest, Dr. Lander was appointed Deputy Director, and on Sir George Beilby's retirement in 1923 he was appointed Director of Fuel Research. At the same time Sir Richard Threlfall became Chairman of the Fuel Research Board.

The many interesting and valuable reports that have been published during the last ten years are evidence of the great progress which has been made under Dr. Lander's direction, and of the valuable results achieved. These reports have been reviewed from time to time in our columns, and they are too lengthy to be summarized here. As Director of Fuel Research he naturally came into contact with many scientific organizations and research bodies engaged in allied activities, and by the cordial manner in which he always received visitors at the Fuel Research Station he has personally done much to bring the results of research, and the benefits obtainable therefrom, to the notice of those concerned. He was elected an Hon. Member of the Institution of Gas Engineers and of the Coke Oven Managers' Association. Dr. Lander is Chairman of the Joint Fuel Committee, the constituent members of which are the Institution of Gas Engineers, the Coke Oven Managers' Association, the Society of Chemical Industry, the Institute of Fuel, the Society of British Gas Industries, and the Institution of Chemical Engineers; and he has served as the Department's representative on a number of other bodies, including the World Power Conference. We understand that the full title of Dr. Lander's new position is Professor of Mechanical Engineering and Motive Power. We can therefore expect, as well as hope, that his interest in the subject of fuel will remain unabated.

Romance of the Mantle

MEMORIES of one of the romances of the Gas Industry have been revived by the death of Mr. Julius Moeller, which occurred on Dec. 23, at the age of 73.

Many changes have taken place in the Industry since Mr. Moeller became, in 1890, Manager of the Incandescent Gas Light Company, Ltd., but surely few fraught with as great significance as that which occurred within the half-dozen or so years following this appointment. After exhaustive investigation, the inventive genius of Dr. Auer von Welsbach produced the incandescent mantle the first patent for which was taken out in December, 1885. At that time it was believed that no more than 50 or 60 lbs. of thorium, which played so important a part in the mantle, were to be found in the world; but subsequent researches brought to light sources of this mineral which had never been dreamt of.

In 1897—or seven years after Mr. Moeller became Manager of the Company—he was interviewed by a writer in the "Sketch," when he revealed some facts connected with the birth of this great ally to the Gas Industry. In the course of this interview, Mr. Moeller said that the invention was put before the public before it was practically completed, and at a time when the materials most essential for incandescent lighting were so abnormally expensive that, for practical purposes, they were absolutely beyond the reach of manufacturers, though an inventor might procure small quantities for himself for scientific purposes. When the first patent was taken out, a big company was started in this country to work it. Everything, except profits, was on a big scale—big offices, big factory, big expenses, big competition, and big opposition. "Soon," he declared, "you will find us lighting the streets, which, but for us, in a few years would have ceased to use gas at all." It was not exactly the case, Mr. Moeller added, that the big company came to a smash, but a great deal of money was lost, and in 1890 when he became Manager most people thought it was in a hopeless condition.

However, five thousand pounds' worth of debentures was issued, and he re-organized the business, and cut down expenses. With each £1 debenture was given as bonus a 2s. preference share. These 2s. shares were transferred in 1895 to the new company at £32 each, and in 1897 were worth about £70. Two more years went by, and things were better, but not brilliant. Then Dr. Auer had an idea of a new method of treating thorium, so the company promptly guaranteed to him the amount for working out practically his idea. The result was the new mantle, and within a year the struggling company became a highly successful financial concern. The organization that had been laid down by Mr. Moeller in previous years enabled it to take advantage of the great success of this new light.

Mr. Moeller declared in this interview that there was nothing to conceal. "Indeed, to be candid," he said, "a company that has brought over two hundred and fifty infringement actions during a few years, and, of course, had to submit to 'discovery' of all kinds, has little mystery." Concluding his article, the reviewer said: "I came away deeply impressed with the energy and administrative ability of Mr. Moeller, the man who had the pluck to take management when the company was at the very bottom of the hill, and now guides the fortunes of one of the most prosperous industrial enterprises in the land."

Note to Australian Subscribers.

It was intimated in the "JOURNAL" for Sept. 30 last (p. 783) that there was every hope that the presentation copies of the "GAS JOURNAL" Calendar and Directory sent annually to our Australian subscribers would be permitted to enter the Commonwealth of Australia free of Customs duty. We have now heard from the London Offices of the Commonwealth of Australia that advice has been received from the Comptroller-General of Customs, Canberra, that the Calendar and Directory is classifiable under Item 339 of the Commonwealth Tariff, and therefore subject to the primage duty of 10 p.ct. only.

January "Gas Salesman."

Will subscribers to the "Gas Salesman" please note that arrangements are being made for the publication of the January issue on the 23rd of this month, in place of the 16th? January is this year a five-Saturday month, so that the date of issue will be round about the customary time.

CORRESPONDENCE

Hydrogenation and Coke Oven Gas

SIR,—I am indebted to Mr. Gordon for the further information in his letter of Nov. 11, which, I believe, serves a better purpose than its ostensible aim of camouflaging Dr. Ormandy's lapse into false argument. As the letter appeared during my absence in the United States, I trust you will allow me to make this belated acknowledgment. In stating the gross percentage requirements of hydrogen for the formation of petrol and hydrocarbon gas from coal at Billingham Mr. Gordon writes with an authority which it would be an impertinence to question, and it is thus a source of some satisfaction to note that he has not refuted, nor apparently wished to refute, anything in my original letter.

The ingenious method of regenerating hydrogen from the hydrocarbon gases by a catalyzed reaction with steam is allied in effect to Bergius's original proposal to recover hydrogen from these gases by cracking, save that in this instance further hydrogen, amounting to about 5 p.ct. on the coal weight, is added to the system in the form of steam. In common with the water gas reaction this process is markedly endothermic, though in a somewhat lower degree, and it is a moot point whether such a process is as economical as the mechanical separation of hydrogen from coke oven gas, this having been yielded from coal at the ovens with, by comparison, very little expenditure of heat. The hydrocarbon gases from hydrogenation might with advantage be added to the coke oven gas and so swell the residual volume of high calorific value gas obtained after hydrogen removal.

The difficulty of using coke oven gas at Billingham is, as Mr. Gordon points out, obvious owing to the distance from an available supply, and the large scale of the operations there; but the point I attempted to stress was the possibility of the adoption of hydrogenation at numerous centres on a comparatively small scale by coke oven owners wishing to utilize their surplus gas profitably.

Since it is now conceded that hydrogen can be extracted at sufficiently low cost from coke oven gas, while simultaneously effecting economic benzole and ethylene recovery, the main point remaining in question is the minimum economic size of unit for coal hydrogenation, and on this the experts, in the persons of Mr. Gordon and Dr. Ormandy, differ. The former claims that a 1000-ton per day unit has been decided on as the economic size at the outset, while the latter is strongly in favour of a 100-ton per day plant in two 50-ton units. I believe Mr. Gordon's predilection in favour of the large size plant is due to the cheapening of hydrogen production when operated on the large scale by catalytic methods. On the other hand, it is to be remembered that separation of hydrogen from coke oven gas can be profitably worked on a much smaller scale—as is evidenced by coke oven concerns on the Continent where as little as 5 million c.ft. of coke oven gas per day have been treated and the hydrogen so separated used for ammonia synthesis.

The coking industry has arrived at a stage when technique has outstripped the ability of the plant owners fully to exploit the advances made, thus, to quote examples:

(1) The advent of regenerative and compound regenerative ovens has effected striking heating economies and rendered available (or potentially available if plants are to be modernized) large volumes of surplus gas.

(2) Methods of utilizing surplus heat from the coke discharged and products distilled from the ovens are now installed which return for use at least 50 p.ct. of the heat imparted to the charge. This heat—when recovered—is obtained in the form of high-pressure steam, and represents an asset hardly touched as yet in the industry.

The three great requisites of hydrogenation are hydrogen, heat, and power, and it is important to note that all of these requirements can be met by the products and surplus energy from up-to-date bye-product coke oven plants. In this connection the importance of the main assets above mentioned is obvious, but it is necessary also to remember the minor reserves of energy such as the power which can be generated by the proper application of coke breeze and the dust, middlings, and refuse from the coal dedusting and cleaning plant normally available at a coking installation.

Since the successful operation of a modern battery of ovens depends financially on a suitable outlet being assured for the surplus gas and energy, it is understandable why, in default of such outlets, so many coke oven owners in this country have been slow to spend the capital necessary to modernize their installations. May I repeat that hydrogenation offers one solution of the difficulty which deserves very full consideration.

L. H. SENSICLE.

Artillery House,
Westminster, S.W. 1,
Dec. 31, 1931.

Salerni System of Low-Temperature Carbonization

SIR,—Referring to the paper read by Prof. R. V. Wheeler at the Pittsburg meeting on the Salerni process and the extract of the same published in the "JOURNAL," the writer begs to be allowed to make a few comments.

Taking the first two paragraphs (1) and (2), it is stated that the fundamental shortcomings of low-temperature carbonization are (1) that the density of the coke is not usually high enough, and (2) that no commercial plant has yet been devised and installed which can be held to be entirely free from mechanical trouble due to expansion and distortion of materials as a result of prolonged heating. Regarding these assertions, the writer can assure M. Salerni that, given a suitable slack amenable to carbonization and a suitable properly constructed retort, as far as a static low-temperature retort is concerned a low-temperature coke can be obtained almost equal in density to a high-temperature coke, although this extreme density is not desirable for easy combustion in an open grate. (2) The reply to this is that the question of expansion of both rotary and static metal retorts has been satisfactorily tackled long ago, even with the shells of the retorts heated to some 600° C.

Later on in the paper it is asserted that there is difficulty in the transference of heat from the periphery of a low-temperature static type of retort to the charge contained therein. With a properly constructed static retort, the exterior heat necessary for carbonization is easily transferred to the interior of the charge; and with his notebook before him, the writer is able to give the figures taken over approximately two years of time by reliable pyrometers—the result being that with a heat of 650° C. in the flue surrounding the retort, the slack charge (some 1¼ tons) was heated throughout at a temperature on the average of 550° to 560° C.

The thickness of the charge was some 20 in., and the time of carbonization, using a fairly dry slack, was 5 hours. The loss of heat was therefore approximately 90° to 100° C., and the water in the slack used—over 12 to 14 p.ct.—had a deal to do with this loss, as could be seen by the dropping of the self-recording pyrometer needle soon after the retort was charged. The writer must be pardoned if he refrains, at this stage, from informing M. Salerni how this rather remarkable transference of heat is effected.

Further, it is asserted in the paper that in low-temperature carbonization the coke produced from a swelling and intumescing coal will stick in the retort whether the same be static or rotary. Dealing with a static type of retort everything depends on the design of the retort, and especially the method of heating, so that the so-termed "black end" (the lower end) is properly heated.

Again, the writer can give some interesting figures taken over a long period of time of steady working with a terrible type of easily swelling slack which began its "sticky" stage at 250° C. The average yield of coke was about 60 p.ct., or some 13 cwt. per ton of slack. When the charge was properly carbonized the coke which discharged itself—as soon as the discharge door was opened—represented some 60 p.ct. of the charge. The remaining 40 p.ct. discharged itself after a little persuasive "tickling" from the man in charge, but this detention of the 40 p.ct. or so was considered by the man as an advantage, as an avalanche of 13 cwt. of hot coke was a nasty job to tackle. Had the writer been using the same type of slack in a rotary retort, the discharge would have been a much more serious matter.

Any "stickiness" can be to an extent ameliorated by an admixture of breeze, as advocated by M. Salerni—it is understood to an extent of 30 p.ct.—but surely the returning for re-carbonization of such a quantity of inert

matter to the retort must be very much like a dog chasing its tail in a circle?

The effect of the mixture of a thick oil with the charge leaves the writer guessing; but as the proposed thick oil decomposes at a temperature a little over 300° C., at which temperature it is fractionated from the original primary oils, it appears to the writer that a sojourn for any length of time at a temperature of (say) 540° C. in the retort would have the effect of converting it into a sticky soot.

F. D. MARSHALL,
M.Inst.Gas E., F.Inst.Fuel.

Iddesleigh House,
Westminster,
Jan. 2, 1932.

PERSONAL

Under the heading "Knights Bachelor" in the New Year's Honours List appeared the name ERNEST DARWIN SIMON, who is probably known to many in the Gas Industry, more particularly on account of the fact that he has been Chairman of the firm of Messrs. Simon-Carves, Ltd., and by his book entitled "The Smokeless City." Commenting upon his career, the "Manchester Guardian" states that Mr. Simon was born in Manchester in 1879. He was educated at Rugby and Cambridge, where he took a first-class honours degree in engineering, and went into the two firms founded by his father—Messrs. Henry Simon, Ltd., and Messrs. Simon-Carves, Ltd. He became Chairman of both these firms, and business has taken him twice round the world, besides much other travelling in foreign countries and the Dominions. He was always interested in politics and local government. In 1911 he entered Manchester City Council, and he persistently condemned bad housing conditions. In 1919 he became Chairman of the Housing Committee, and in 1921 he was Lord Mayor of Manchester. For a few months in 1923 to 1924 he was Liberal M.P. for the Withington Division of Manchester, and in 1925 he left the City Council. An acknowledged authority on municipal affairs, and particularly on housing, his books, "The Smokeless City," "A City Council from Within," and "How to Abolish the Slums," are well known. In 1929 he was again returned to Parliament for Withington.

Mr. G. RENWICK, who is retiring after 52 years' service with the Newcastle-upon-Tyne and Gateshead Gas Company, has been presented with a handsome armchair by his colleagues. Mr. T. P. Ridley, Secretary and Commercial Manager of the Company, made the presentation on behalf of the staff. Two years ago, on reaching his 50th year in the Company, Mr. Renwick was the recipient of a gold watch.

Mr. SEYMOUR J. BOLES and Mr. ARTHUR BROOKS, Officials of the Newcastle-upon-Tyne and Gateshead Gas Company, who are retiring after a long association with the Distribution Department, have been presented with a silver tea service and wallet of notes respectively by Mr. W. Batt, Distribution Superintendent. Mr. Boles has been with the Company since 1887 and Mr. Brooks since 1884.

Mr. FREDERICK WILLIAM PLUMMER (68), of Luton, Beds., Chairman of the Luton Gas Company, left a gross estate of £48,907 (net personalty, £42,223).

The Bridge of Weir Gas Company, Ltd., have appointed Mr. MATTHEW CAMPBELL Manager in place of Mr. Angus Cunningham, who has resigned. The new Manager spent seven years at Stewarton Gas-Works and ten years at Fraserburgh.

Mr. E. LINGFORD (67), of Cotherstone, Yorks., senior partner of Joseph Lingford & Son, baking powder manufacturers, of Bishop Auckland, a Director of Bishop Auckland Gas Company and of Rock Building Society, left £60,462 (net £54,086).

OBITUARY

The death has occurred at the age of 84 of Mr. MATTHEW RICHLEY, of Shotley Bridge, Durham, who was Secretary of the Shotley Bridge Gas Company for many years and had over 50 years' service with the Company when he retired a few years ago.

The death has occurred of Mr. ALBERT BIRD, Chief Accountant to the Colombo Gas and Water Company, Ltd., after an illness of some six weeks. Mr. Bird counted 22 years' loyal service with the Company, and his death will be keenly regretted by his many friends.

REVIEWS

PRACTICAL JAPANNING AND ENAMELING.*

An extremely useful book on the practice of japanning and enamelling, by William J. Miskella, who is a Consulting Engineer on Finishes and Finishing Problems, is published by Finishing Research Laboratories, Inc., Chicago. Twenty-two chapters are interspersed with 141 illustrations and 18 tables, and there are five colour plates. Those who study this book will gain a comprehensive grasp of the work entailed in modern japanning and enamelling and will learn a great deal about the equipment involved; while those already engaged in the industry will find the volume exceedingly helpful for reference. As our readers are aware, gas is used extensively in the operations of japanning and enamelling, and the author devotes much space to the efficient application of gas, and describes in considerable detail the various gas appliances employed. To gas undertakings this information will prove of particular value, as also will Mr. Miskella's account of the utilization of competitive fuels.

An idea of the scope of the book will be gathered if we enumerate some of the chapter headings: Related Materials and Processes; Raw Materials; Japans and Enamels; Reducers; Putties and Fillers; Baking Varnishes; Shop-Cleaning Equipment; Sand-blast Equipment and its Operation; Preparing the Surface; the Spray Method of Application; Oven Design; Gas Burners; Baking Ovens; Accessory Equipment; Lithography Ovens; Mechanical Decoration.

"Practical Japanning and Enameling," written by an acknowledged authority on the subject, is, in brief, a reliable book which we can thoroughly recommend. Those of our readers who are interested should make application for the book through the "GAS JOURNAL" Offices, Walter King, Ltd., 11, Bolt Court, Fleet Street, London, E.C. 4.

* "Practical Japanning and Enameling," by W. J. Miskella. Published by Finishing Research Laboratories, Inc., Chicago; price $3 50.

MECHANICAL WORLD YEAR BOOK, 1932.

This useful handbook is published by Messrs. Emmott & Co., Ltd., of 65, King Street, Manchester, at 1s. 6d. net. In accordance with the Publishers' usual practice of making this publication an up-to-date source of reference for engineers, several improvements and new sections have been added to the 1932 edition.

The sections on tooth gearing, metals and alloys, and structural engineering have been entirely re-written and enlarged where necessary, and a new section on electric and gas welding and cutting added. In addition, the sections on steam boilers, internal combustion engines, belt conveyors, hydraulics, steam engines, turbines, and condensers, along with many others, have been brought up to date. The new index of this edition is arranged under principal subject headings, and suitable cross references are inserted where necessary. This should facilitate the use of this volume in the designing of power plant and machinery, and present in a concise form information and data often required in workshop practice.

The handbook, besides embodying the calendar and diary for the year, contains considerable practical information in the shape of conversion tables, data on steam engine efficiency and construction; notes on condensing plant; boilers; superheating; a section on gas engines—this section by Mr. W. A. Tookey, an extract from whose paper before the Manchester Institution of Automobile Engineers on the subject of gas engine efficiency was published in the "JOURNAL" on Dec. 2; there is also a section on oil engines by the same author. The subject of pipes and tubes is fully dealt with, and also transmission, belting, &c., while friction and lubrication receive attention. A chapter on belt conveyors is of interest, and tables of logarithms, trigonometrical ratios, functions, and equivalents complete the technical matter.

THE NEWS OF THE WEEK

The Re-Sheeting of the Gasholder at Cove and Kilcreggan has been completed, and the town's gas supply made available again. The town was without gas for several weeks while the work was going on.

To Meet a Growing Demand for Gas in the district, the authorities of the municipal gas undertaking at Zurich, Switzerland, propose to expend a sum of about £105,000 on an extension of the retorts at the gas-works at Schlieren.

The Geyser Manufacturing Company, Ltd., has been registered at 128, Granville Road, Childs Hill, N.W. 2, as a private Company, with a capital of £1000 in shares of £1 each, for the purpose of carrying on business as geyser manufacturers and metal workers.

The Annual Report of the Swadlincote Urban Council shows that the general working expenses totalled £15,345, as against £15,950 in 1930, and income £19,690 as compared with £20,536, giving a gross profit of £4345. Loan repayments and interest, and income-tax on the previous year's profit and contributions to special funds amounted to £4648, while a sum of £1500 (normally chargeable to capital) was expended. Thus a net loss of £1803 was entailed which was contributed from the rate fund.

The Woking District Gas Company, stated the "Financial Times" in a recent "Potential Investments" column, was registered as a limited Company in 1890 and incorporated by Special Act in 1912. The statutory area of supply is about 57 square miles, comprising the urban district of Woking and a number of adjacent parishes. The standard price of gas is 18·2d. per therm, and the price at the end of 1930 was 12·5d. Ordinary stock dividends are subject to the usual sliding scale.

William and Henry Haworth are the subject of the eighth issue of the little periodical published by the Carron Company, of Carron, Falkirk, in the series "Famous Men and Carron Works." The brothers Haworth, it is stated, may not, perhaps, be described as "famous" men. To some extent their genius was subordinated to help in the development of a great new trade in Scotland. While employed at the Carron Works, the brothers contributed some wonderful old masterpieces of the wood-carver's art.

"**Gas is Cheaper** in Rotherham than anywhere else in Great Britain" is the caption of a new leaflet issued officially from Rotherham inviting industrialists to build their works and factories in the district and so take advantage of the cheap gas supply for industrial purposes. It is stated that the price of gas for industry has been fixed at 1½d. per therm unpurified and 2½d. per therm purified—all at 500 B.Th.U. This is claimed to be very substantially the lowest rate that can be offered by any gas undertaking in Great Britain.

A Public Utilities Committee was formed some time ago at Christchurch, New Zealand, at the instigation of the City Engineer. It consists of the engineers of all the public services in the district operating in or upon the roads, the engineers of the local bodies immediately surrounding the city, and the Public Works Department. The objects are to co-ordinate as far as possible the opening-up of streets for the installation, repair, or renewal of underground services with the local bodies' programmes of road surfacing and repairs, and also to study and report on engineering matters of common interest.

A Series of Portable Showrooms is to be installed in suburban districts by Halifax Corporation Gas Department. The first of these was formally opened on Dec. 29, on spare ground at the end of Queen's Road, Pellon Lane. The scheme of these showrooms was specially mentioned by Mr. W. B. McLusky (Engineer and General Manager) at the December meeting of the West Riding Gas Salesmen's Circle. If the showroom is a success it will be quickly followed by similar ones in three or four other districts in the Company's area of supply. On the other hand, if it does not prove a success in this particular district it can be dismantled and re-erected elsewhere within a day.

The Price of Gas at Moffat has been reduced by 5d. per 1000 c.ft.

The Unemployment Grants Committee have refused to give Largs Town Council a grant for their new gasholder which is in the course of erection and which is to cost approximately £5000.

Guildford Gas Light and Coke Company.

The Guildford Gas Light and Coke Company was dealt with in the "Potential Investments" column of a recent issue of the "Financial Times," when it was mentioned that the Company was established in 1824 and incorporated by Special Act in 1857, further powers being obtained in subsequent years for supplying the borough of Guildford and the surrounding district. The Cranleigh Gas and Electricity Company, authorized in 1928, has been acquired for £42,500 by the issue of ordinary and preference stock, with effect from Jan. 1, 1932. There is also to be a debenture stock issue.

Guildford is excellently served by rail and road, and, in addition to its commercial and manufacturing activities, there is a large and rapidly increasing residential population. As a result, the operations of the Company have progressively increased, the sales of gas in 1913 being 193 million c.ft. and during 1930-31 nearly double that quantity.

The statutory fixed standard price of gas is 16·4d. per therm and the ordinary dividends are subject to the usual sliding scale. Recent reductions in price have been: September, 1927, and December, 1928, 3-5d. per therm each time, and September, 1931, 1-5d., making 9 4-5d. per therm.

Locked, Barred, and Bolted.

A demonstration of how a full course dinner can be cooked at the same time and without any attention was an interesting feature of the demonstrations held at the Gas Service Department at Chesterfield on Tuesday and Wednesday, Dec. 15 and 16. The demonstrator was Miss Eason, of Messrs. Radiation Ltd., and the gas cooker used was of the latest type, the Arden Hill "Acme New World," which is automatically controlled.

Mr. H. Davies, Engineer and Manager of the Gas Department, introduced the lecturer, and explained why these demonstrations were being held.

The menu which was demonstrated consisted of roast chicken, sausages, and bacon, bread sauce, potatoes, brussel sprouts, apple pie, and baked custard. All these dishes were placed in the oven together at 7.15, the door closed and a chain passed round the cooker and padlocked. On the first night Mrs. Clark, wife of Alderman G. Clark, J.P., Chairman of the Gas Committee, locked the door and held the key until 8.15, when she unlocked the door and the dinner was taken out perfectly cooked. On the second night the same menu was cooked, and Mrs. H. Davies locked and unlocked the door. While the meal was cooking Miss Eason gave a demonstration of several seasonable dishes.

Free Maintenance Scheme at Newbury.

At a recent meeting of the Newbury Corporation Gas Committee the Gas Manager (Mr. W. R. Davey) reported on a scheme for the free maintenance of gas appliances used by ordinary consumers.

At the March meeting he prepared a report on advertising policy, and included in this was a scheme of free maintenance of consumers' gas appliances. The Committee were at the time so favourably impressed with its possibilities that a three months' trial was made, and 250 of the "ordinary" consumers were visited at a cost of £31, equal to nearly 2s. 6d. per consumer. This trial, however, was

made in a purely residential district, and it was probable that the average cost per consumer in the business area would be quite double that amount. It was therefore safe to assume that the average cost per "ordinary" consumer over the whole district on the basis of one visit per annum would be 3s. 6d., or a total cost of about £235. This amount represented only 2 p.ct. of the total income from gas used by these consumers. The whole of this was not necessarily additional expenditure, as under existing arrangements consumers who asked for fires, cookers, &c., to be cleaned and adjusted were not charged with the cost unless materials were used.

One of the chief aims of free maintenance was, however, to reach that large number of apathetic consumers who allow appliances to fall out of use rather than take the trouble to call or send to have the fault remedied. With unusable gas apparatus in a house, the door can be considered closed for extra appliances. Free maintenance would put these unsatisfactory appliances into use, and pave the way for increased business.

Assuming, therefore, that the Committee agreed to the principle of free maintenance and were willing to sanction the extra cost, it now remained to organize the scheme to enable the work to be carried out to the best advantage.

The Committee decided that the suggestions contained in the special report of the Manager be adopted for a temporary period with respect to all ordinary consumers and hope that it will be possible at a later date to apply the same to prepayment meter consumers, so that eventually all the consumers of the undertaking will receive the benefits of the scheme.

Institution of Gas Engineers.

Members of the Institution are invited to attend the meeting of the Illuminating Engineering Society on Friday, Jan. 8, at 7 p.m., at the House of the Royal Society of Arts, John Street, Adelphi, London, W.C. 2, when a paper on "Motor Car Headlights" will be read by Mr. E. S. Calvert, B.Sc., A.R.C.Sc. (Dub.).

Light refreshments will be provided at 6.30 p.m.

Tickets of admission may be obtained from the Secretary, the Institution of Gas Engineers, 28, Grosvenor Gardens, London, S.W. 1.

Mr. John Wilkinson's Work at Nottingham.

Hopes had been entertained by those who are desirous of maintaining the amenities of public life in Nottingham that some equitable consideration might be paid by the Municipal Authorities to the claims of Mr. John Wilkinson upon his retirement, after twenty years' service, from his position as Engineer and General Manager of the Corporation Gas Undertaking. The Gas Committee, of which Alderman Sir Albert Ball is Chairman, had recommended that in recognition of his valuable services to the Municipality, Mr. John Wilkinson, who in May last was called upon, in circumstances which will be remembered, to relinquish his position, should be granted a gratuity of £3600, equal to two years' salary.

The Committee's recommendation as to the gratuity to be granted had aroused opposition in the city, but the Committee in their report had emphasized the consideration that during the period of Mr. Wilkinson's management the Gas Undertaking had prospered in a remarkable degree. During that time, the report added, he carried out his duties with conspicuous ability, and the Gas Department had thrived under his management.

When Mr. Wilkinson took charge, the financial position of the Undertaking was far from satisfactory, the accounts showing an appreciable loss on the previous year's working. "During his tenure," the report continued, "the Department has shown marked improvement, the equipment of the works having been brought up to date. The sales of gas have continually increased, and the Undertaking has shown a substantial profit each year. Your Committee have had under consideration the question of the allowance to be made to Mr. Wilkinson upon his retirement. Although he is over 60 years of age, he has not completed 40 years' service with the Corporation, and he therefore does not come within the provisions of the Local Government Superannuation Act of 1922, which would entitle him to superannuation allowance. The Act provides, however, that the Corporation may grant to any officer or servant, who is not entitled to superannuation allowance under the Act, upon his retirement from the service, such gratuity as the Corporation may by resolution determine, not exceeding a sum equal to twice the amount of the salary or wages of such officer or servant during the year which immediately precedes his retirement. Such gratuity is chargeable to the same funds as those upon which his salary is charged."

Having regard to the fact that Mr. Wilkinson had served the City Council for twenty years, and the Gas Undertaking had prospered in a remarkable degree during that period, as was shown by the fact that no less a sum than £601,540 had been contributed to the relief of the rates, the Committee felt that it was a case which should be dealt with under the provisions of the Act.

Opposition to Report.

Upon the terms of the report becoming publicly known, however, opposition was manifested in various quarters of the City regarding the proposal, and at a meeting of the Gas Committee on Friday, Jan. 1, it was decided to ask the Council's permission to withdraw the recommendation. Ald. Sir Albert Ball, who presided at the Committee meeting, expressed subsequently to a Press representative his strong feeling of disappointment over what he regarded as an act of injustice.

Incidental to the withdrawal of the report at Monday's meeting of the Council the information was elicited from the Town Clerk (Mr. W. J. Board) that the question of a superannuation allowance for Mr. Wilkinson had been before the Salaries Committee of the Corporation upon three occasions. Mr. Wilkinson, in his letter of resignation, had asked to be placed upon the retired list, with such superannuation pay as he might be entitled to. The Salaries Committee had ultimately referred the question back to the Gas Committee to deal with.

Mr. J. Cobley, one of the most active members of the Labour Party in the Council, who have been persistent in their antagonism to Mr. Wilkinson, asked whether in view of the withdrawal of the report, the Chairman of the Committee (Sir Albert Ball) would now tender his resignation.

Ald. Sir A. Ball said that the Chairman of the Committee would resign his position when a majority of the Committee requested him so to do, and not at the suggestion of an irresponsible member of the Council.

Further discussion terminated with the formal withdrawal of the report.

Public Lighting of Manchester.

City's Proposal to Lift Embargo on Gas.

For ten years all the new roads on the Manchester housing estates have been compulsorily lighted by electricity. The City Council are, this week, discussing a recommendation to give the Gas Department an opportunity of competing again with the newer illuminant. "It is not," states the "Manchester Guardian," "in a spirit of interdepartmental rivalry that the proposal comes forward." The Public Lighting Sub-Committee of the Paving Committee advances it on the suggestion of the City Engineer, Mr. Meek.

The City Engineer considers that the embargo which, by resolution, the City Council imposed on gas hampers the Sub-Committee by preventing the presentation of comparative propositions and estimates. He thinks they should have power to adopt any standard they think suitable to any individual street.

"Gas has," says the "Guardian," "accepted its ten years' banishment philosophically, but its advocates modestly claim that in fog it is the superior lighting element, and that it should be cheaper to the City since one gas main in a thoroughfare serves for both lighting and cooking, while separate cables are necessary to carry the respective currents of electricity."

The paper goes on to remark that the circumstance of opening the question to tender again should also encourage economy.

Consumer Aid Service.

We are informed by Messrs. James Stott & Co. (Engineers), Ltd., of Vernon Works, Oldham, the well-known hotel, restaurant, and canteen equipment engineers, that this unique service, introduced only a short time ago, is proving very popular with the Gas Industry, and has already been used to great advantage by numerous gas managers.

To anyone who has not had particulars of this service, we might say the idea is to promote a closer co-operation between consumer, Gas Industry and manufacturer. To take an illustration of the value of consumer aid service—suppose you had a valuable customer who ran a café, hotel, or restaurant, and who, in the midst of a busy season was

THE NEWS—continued.

confronted with a breakdown in his stillroom set, water boiler, or combination water boiler, coffee making, and milk warming urn, and was faced with consequent loss of custom and disorganization. You can then immediately offer to loan him a similar apparatus, irrespective of the make that has failed, until the necessary repairs have been effected.

This service is free to the Industry or its customer, and the Industry is under no obligation to the firm. The only benefit the firm obtains is demonstration of the utility and service of Stott products.

The firm will be pleased to forward more detailed particulars to anyone interested.

Brownhills Council and the Gas Undertaking.

There was further strong opposition at a meeting on Dec. 31 convened at Brownhills to discuss the local Council's proposed Parliamentary Bill to acquire the Ogley Hay and Brownhills gas undertaking.

The Chairman (Mr. H. V. Emery) said a great deal had been made of the condition of the gas-works, but that need not be considered, as the price would be fixed by arbitration according to the condition it was in. If the Council did take over the gas-works they would manage it in a businesslike way.

Mr. J. B. Lane, of the Brownhills Chemical Works, and a strong opponent of the proposal, expressed dissent.

Colonel Humphries said he had considered the question seriously and had come to the conclusion that he ought to support the proposal.

Dr. Stewart also spoke in support of the Bill.

New Carbonizing Plant for St. Ives.

Woodall-Duckham Installation Adopted.

The St. Ives (Cornwall) Town Council, at its meeting on Wednesday, Dec. 23, discussed the modernizing of the municipal gas-works. The Gas Committee recommended approval of a scheme for the installation of vertical retorts, and the acceptance of a tender and specifications of the Woodall-Duckham Company, involving an expenditure of £10,000. It was stated by the Gas Manager, Mr. F. R. G. Grant, that two tenders had been received.

The Chairman of the Gas Committee, Mr. G. G. Warren, said the proposed new plant was guaranteed to produce 20,000 c.ft. of gas per ton of coal, as compared with 14,000 c.ft. with the present system. Taking their annual manufacture of gas at 37 million c.ft., which was the estimate for next year, the old plant would consume 2696 tons of coal, which at 33s. per ton would cost £4299, while with the new plant they would produce the same amount of gas with only 1850 tons of coal, at a cost of £3052. With the saving of labour which would also be made possible the actual saving would amount to £1326.

On being put to the vote the Committee's recommendations were adopted.

Gas in Sheffield Industry.

Once again with the new year the two leading Sheffield "Dailies," the "Telegraph" and the "Independent," respectively published industrial supplements of large dimensions comprehensively reviewing the progress of industry in general and in Sheffield in particular during a year which is believed to be the turning point in our country's fortunes.

The developments that have been, and are still, taking place in the Gas Industry, and the value of the Sheffield Company's Research Laboratories, received full attention in an article in the "Sheffield Daily Telegraph," where it was remarked that no matter what walk of life or what phase of industry one comes face to face with, gas is playing its part in the progress and comfort of the human race. Gas in the home, for outdoor lighting, gas fires, water heaters, washing machines, refrigerators, and gas as an industrial fuel are all examined in turn, while illustrations show examples of gas-fired sheet mill furnaces, two of which are completed and two in course of construction at the Tinsley Works of Thos. Firth & John Brown, Ltd., and also a corner of the new all-gas shop at the Clarence Works of Messrs. Swift, Levick, & Sons, Ltd.

Furnace Demonstration.

Realizing the important part that town gas is destined to play in the near future in all Sheffield industries, the article states, the Gas Company, with their usual enterprise, have removed their furnace demonstration room to larger and more convenient premises at their Effingham Street works. The furnace room has been completely modernized and is now replete with all up-to-date furnaces and equipment for assisting manufacturers to carry out any work of an investigational nature in connection with the use of gas for industrial purposes.

The industrial staff of the Company also has been increased and a fully qualified industrial research chemist has recently been appointed. A new physical, chemical, and metallurgical laboratory has recently been opened, specially equipped for carrying out any kind of research work on materials and processes in connection with the Sheffield industries.

It is confidently anticipated that these laboratories will be of valuable assistance to manufacturers in Sheffield in overcoming and difficulties and problems in connection with the industrial use of gas.

The front cover spread of the Supplement was secured by the Company for the purpose of publicity, the theme of the design being "Gas—the Leading Light."

The "Independent's" survey of gas progress was on similarly interesting and comprehensive lines, and in this paper in addition details were given of the "First National Gas Grid," and the objects and advantages of this giant scheme, involving the laying of 73 miles of piping at a cost estimated to be in the region of £537,000, are set forth.

The Grid Scheme.

The scheme, as approved by the Government, briefly is as follows:

It will collect gas from 19 coke oven plants, and is designed to take a maximum volume of 80 million c.ft. of gas per day.

The gas will be conveyed under pressure through the network to the industrial works, and also to the works of the Sheffield Gas Company.

Compressor plants will be installed at the coke ovens; and their cost and the cost of operation, therefore, will have to be met by the Coke Oven Owners, but will be covered by them in the price of the gas.

The total cost of compressor plants will be £63,400.

There will be 73½ miles of mains, made of steel and varying from 6 in. to 30 in. in diameter; with hessian cloth and bitumen coating. The cost of the mains will be £232,800, and the cost of laying them £241,700.

A Successful "Suggestion Scheme."

The suggestion scheme which Messrs. Sidney Flavel & Co., Ltd., of Leamington, introduced as a special Christmas Holiday Bonus into their various works and showrooms has been highly successful.

A gratifying feature was the interest and friendly rivalry manifested in the various departments. These, without exception, submitted suggestions which would, in their opinion, prevent waste, improve the firm's products, save time, and foster co-operation, and, in fact, anything that would benefit or advance the interests of the Company or its employees.

The judging was in the hands of a Committee who had no knowledge of the authors of the various suggestions, and no marks were awarded for diction, grammar, or handwriting.

The first prize, £25, was won by a "millwright;" the second prize, £15, by a lady member of the staff; and the third prize, £10, by a fitter. In all, 153 Christmas prizes were awarded.

It is the firm's intention to continue the scheme during 1932, when, in addition to the periodical awarding of prizes, successful competitors will receive monetary awards on the saving or value to the firm of their accepted suggestion.

Liverpool Gas Progress.

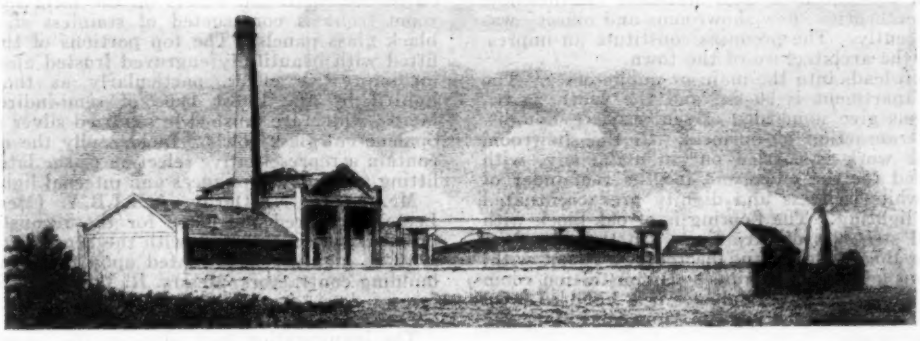
The Liverpool Gas Company, stated the "Financial Times" in a recent "Potential Investments" column, was established in 1816 and incorporated by Special Act in 1848. In 1926 the Woolton Gas Company was acquired, and the area of supply now covers about 67 square miles, with a population approaching 1,000,000, including Liverpool, Woolton, Bootle, Waterloo, Great Crosby, Aintree, and other districts.

Dividends are subject to the usual sliding scale, and the fixed statutory standard price is 12·4d. per therm. High-class financial and administrative control have benefited both the Company and consumers. The old 7 p.ct. preference stock has been redeemed and additional capital obtained at cheaper rates, while there have been successive reductions in the price of gas for all purposes.

History of the Worthing Gas Light and Coke Company

[From an article by S. O. STEPHENSON, the last Engineer and Manager to the Company, in the Brighton, Hove, and Worthing Gas Company's Co-Partnership Magazine]

On Nov. 4, 1833, John Bryan, of Maidstone, and of the firm of Bryan, Howden, & Co., Gas Contractors, of Bankside, Southwark, entered into an Agreement with the Town Commissioners of Worthing to light the town with gas. The Agreement, which was for a term of 21 years dating from Sept. 1, 1834, specified that he was to obtain a site, erect works, lay mains, supply the necessary lamp columns and lamps, and commence lighting by that date. There were to be 120 lamps, fixed in positions selected by the Commissioners within the limits of the area already lighted by oil, each lamp fitted with a burner consuming 5 c.ft. per hour, and to be lighted between one hour after sunset and one hour before sunrise, the lighting season extending from the 1st day of September to the 1st day of April. The Commissioners agreed to pay for this service the sum of £3 per lamp per annum, and, in the event of any failure of the gas, oil lamps of equal lighting power were to be substituted. The lamps were not to be lighted for four nights at the full moon. Full powers were given to connect up to and supply private residents and business premises and a Purchase Clause was inserted, empowering the Commissioners to acquire the undertaking at the end of the 21 years, the price to be fixed by arbitration.



WORTHING GAS-WORKS, 1835.

On Dec. 20, 1833, Mr. Bryan purchased from John, Richard, and Harry Newland (Trustees for George Newland) a piece of land in the Home Field for the sum of £236 5s. It was a rectangular piece of ground measuring 150 ft. from North to South and 79 ft. from East to West, and contained a limekiln. Thereon Mr. Bryan proceeded to erect a works for the supply of gas to Worthing.

This original site constitutes the entrance yard to Worthing Gas-Works as it stands to-day. It was but a village works, carbonizing 250 tons of coal and selling about 2¼ million c.ft. per annum. The retort bench consisted of two beds of two and three cast-iron retorts, 6 ft. 6 in. long respectively. There was no station meter nor for that matter were all the consumers provided with meters, a number being supplied by contract. There was one gasholder 24 ft. in diameter by 8 ft. deep containing 3500 c.ft. of gas. The holder was counterbalanced, there being, of course, no exhauster. The illustration of the works which accompanies this article has been kindly lent by Mr. E. Apted, of the Worthing Gas Offices. It formerly adorned the head of the first Share Certificates issued, possibly to reassure the shareholders that there really were tangible assets for the capital invested. The illustration is quite good, though the perspective makes the holder appear larger than it actually was. We came upon the tank of this holder about four years ago when the ground started subsiding. Old oak baulks had been used for the purpose of covering over. A part of the old retort house still stands, the stokers' mess room and laboratories occupying the site. The limekiln can be seen on the right of the illustration.

The price of gas was 15s. per 1000 c.ft. where meters were fixed. To those consuming under contract (no meter) a charge of so much per burner was made. This varied, but, generally speaking, was from £3 to £4 per burner per annum.

In 1835 a Syndicate, of which the principal parties were Robert Hazell and Alexander Randall, of Maidstone, and Richard Plumer and Charles Roberts, of Worthing, entered into negotiation with Mr. Bryan for the purchase of the undertaking and, after considerable chaffering, agreed upon a price of £8500, the value being assessed by Mr. Bryan at £3900 for the works and land, and £4600 for the mains, services, and street lamps. The Syndicate then proceeded to float a Company with a capital of £10,000 in 200 £50 shares, which was subscribed in September, though the date of taking over was fixed as from July 1. The Worthing Gas Light and Coke Company therefore officially commenced its existence on July 1, 1835.

The qualification for Directorship was the holding of three £50 shares, and the first Board of Directors numbered ten.

Messrs. Robert Hazell, Thomas Edmett, and Alexander Randall were appointed Trustees. Mr. Charles Roberts was appointed Secretary at a salary of £30 per annum, Mr. Richard Plumer, Treasurer at £30 per annum, and Mr. G. White, Manager at £1 1s. per week. The latter, however, received extras in the shape of a bonus on new business obtained and for laying services. As part of the agreement with Mr. Bryan he was to hold twenty shares in the Company and to act as Consulting Engineer for three years without fee, paying four visits a year to the works.

The number of consumers at this date was 69 and the first year's gas rental is of interest:

	£	s.	d.
Private consumers	502	6	2
Public lighting	354	0	0
	£856	6	2

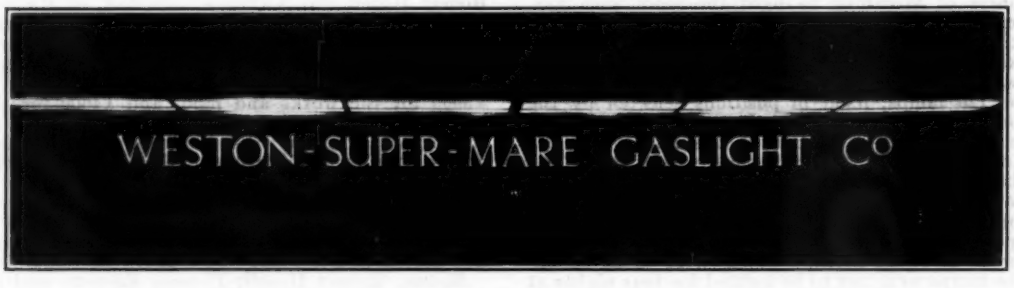
Obviously the public lighting contributed a very material part of the Company's revenue, and these figures render more striking the high capital, which, amounting as it does to nearly £4500 per million c.ft., must have placed an almost intolerable burden upon the Company at the outset of its career, and no doubt largely contributed to its early troubles.

Coal was, in these early days, being purchased through a local firm of Wine and Spirit Merchants, who added coal dealing to their activities. The total cost, delivered into the works, was 28s. per ton which included 2s. 6d. for Town Dues. It was brought from the Tyne in flat-bottomed boats which were beached at high tide near to the present Worthing Pier, and was conveyed by carts across the beach to the works. The receipt for the Town Dues specified that they were imposed by Act of Parliament made and passed in the second year of the reign of George IV., for the paving of the Town of Worthing.

The limekiln was leased at a rental of £20 per annum, but, there being a difficulty in letting, it was pulled down in 1836 and a manager's cottage built in its place. The latter was gutted many years later and converted into a sulphate house, to which purpose it is still put.

- Imposing Showrooms and - Offices at Weston-super-Mare

Remarkable Business Expansion necessitates corresponding Accommodation



CONCEALED LIGHTING ARRANGEMENT AND FASCIA BOARD OUTSIDE SHOWROOMS.

During the past twenty years the Weston-super-Mare Gaslight Company has doubled its sale of gas. To cope with the rapid expansion of business, the manufacturing plant has been brought to a high standard of efficiency; and the latest enterprise—new showrooms and offices—was inaugurated recently. The premises constitute an impressive feature of the architecture of the town.

The showroom leads into the main or public office. The length of the apartment is 90 ft., and the width 25 ft., which dimensions give some idea of the resources for display and the transaction of business. In the showroom department the work is carried out in mahogany, with light-oak utilized for the office and for the remainder of the building; while richness and dignity are accentuated by the mellow lighting. The flooring is of oak-block with tasteful central stretches of carpeting. On the first floor are located the Board Room and Secretary's room, with, at their rear, an admirably equipped demonstration room with a seating capacity for an audience of a hundred. On the second floor there are the typists' room, and filing and telephone departments.

External Lighting.

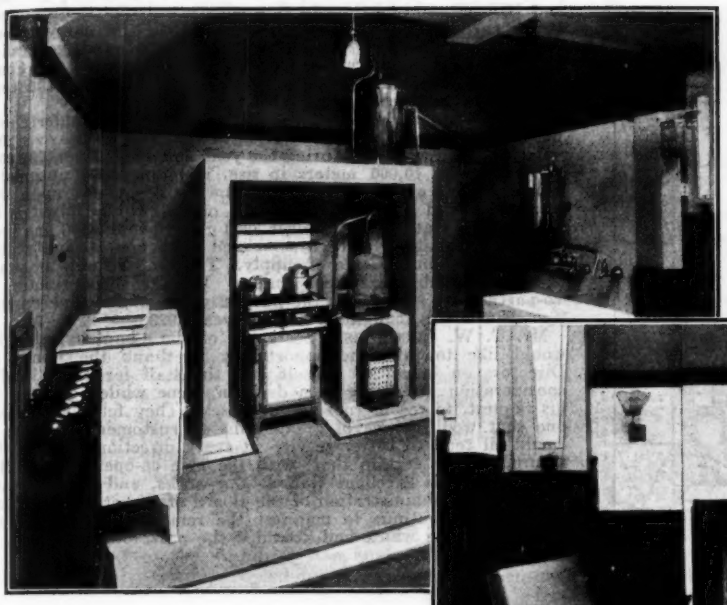
The external lighting of the showroom is unique. As far as we are aware, it is the only gas showroom so fitted with concealed and reflected light. It is very effective, throwing a pleasing beam of light through coloured glass on to the enamelled letters on the facia sign. The showroom front is constructed of stainless steel frames and black glass panels. The top portions of the windows are fitted with beautifully engraved frosted glass, which gives an impressive effect, particularly as the windows are lighted by the latest type of semi-indirect ventilating lamps, which are finished in oxidized silver and fitted with opalene cut-glass bowls. Incidentally the new showrooms contain a representative selection of the latest ideas in the fitting up of gas appliances and internal lighting fittings.

Mr. N. H. N. Darby, A.R.I.B.A. (Messrs. Darby & Leete), prepared the plans for the reconstruction of the premises, in consultation with the Secretary and staff, and is to be highly congratulated upon the results; as are the building contractors, Messrs. R. Wilkins & Son, Ltd.

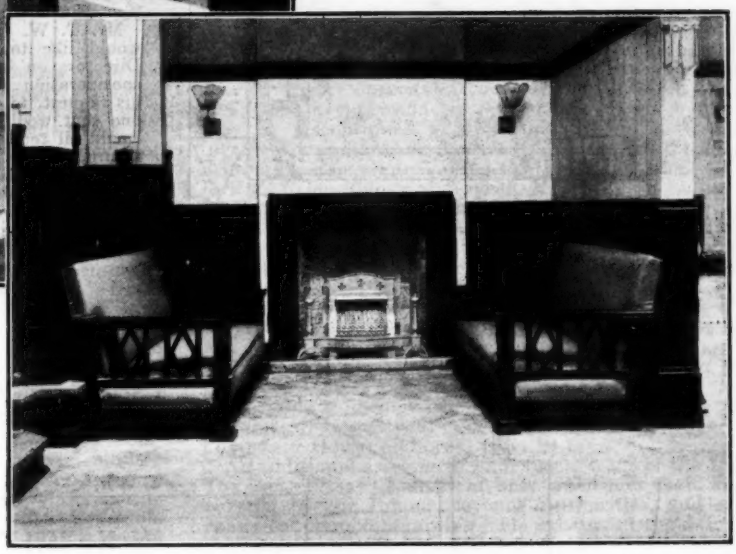
Opening Ceremony.

The inauguration took place in the presence of a large attendance of shareholders and others. The Directors present were: Mr. Henry Butt, J.P., C.C. (Vice-Chairman), Capt. H. G. Picton Davies, M.C., and Col. G. Flemming,

INTERIOR OF SHOWROOMS LOOKING TOWARDS RENTAL OFFICE.



MODEL KITCHEN.

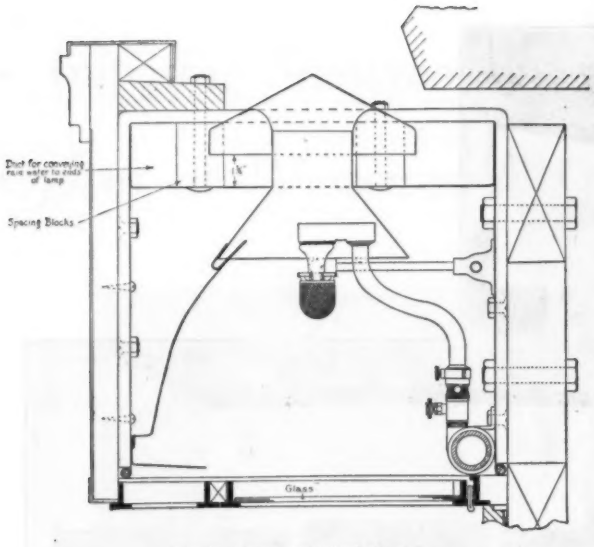


LOUNGE.

O.B.E., M.C., with Mr. T. W. Luckhurst (Secretary of the Company).

Mr. BUTT, who offered a welcome to Mr. J. H. Gray, the veteran former Manager of the Company, observed that the only regret attaching to their meeting together on a pleasurable and important occasion was the fact that the Chairman of the Company (Mr. J. E. Norman) was unfortunately unable to attend as the result of doctor's orders. Mr. Norman had been associated with the Company as Chairman for more than twenty years, and throughout that period had done everything he could to further the interests of the undertaking. Mr. Butt

ANOTHER VIEW OF THE INTERIOR.

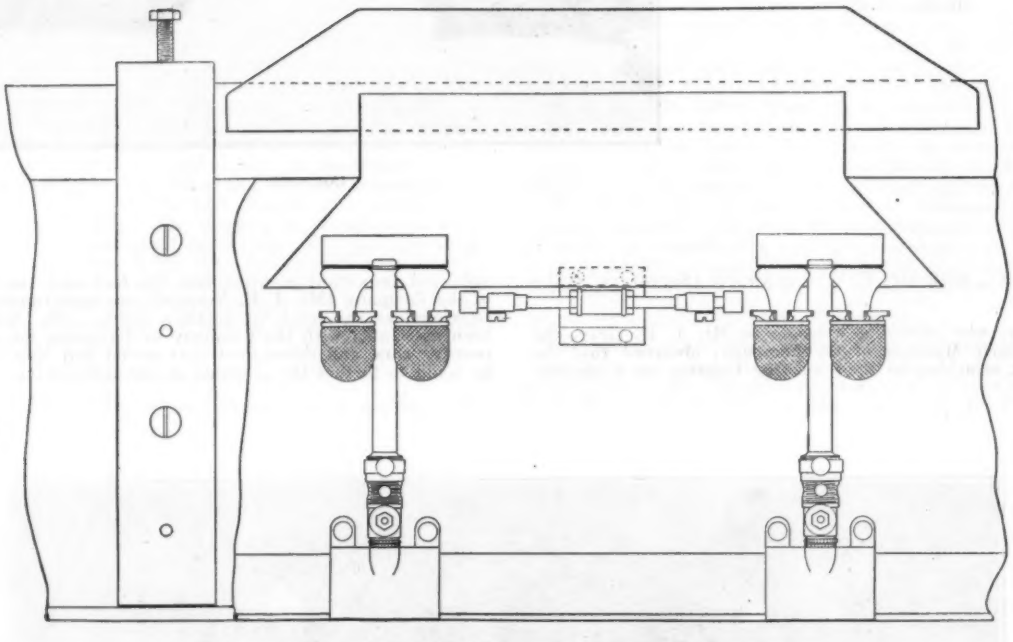


Fascia Lamp.—End Elevation.

explained that in accordance with its powers the Company possessed the right to extend operations to Bleadon, Hutton, and Banwell, and he thought it would be utilizing those powers at the earliest possible moment when facilities for carrying out the work were better. The scheme was in hand, and, generally, he thought the public would see that the Directors of the Company were determined to do all that was possible for the continued prosperity and progress of the undertaking.

In a written address Mr. NORMAN stated: Our undertaking has made continued progress. To-day our employees are over 200; salaries and wages paid during the year amount to over £32,000. We have over 10,000 meters in use, including 5570 automatic meters. That our consumers are now so dependent upon the economical and hygienic advantages of gas will be obvious to you, when I state there are over 8000 gas cookers, 8500 gas fires and 2400 radiators, 808 geysers, and 1671 boilers and water heaters in use in our area of supply. The gas sold now amounts to over 412 million c.ft. per annum. We have been running a co-partnership scheme for the past 22 years, and a superannuation scheme was inaugurated in the year 1923.

Mr. T. W. LUCKHURST, Secretary of the Company, said he would like to take the opportunity to thank the Board of Directors on behalf of himself and the staff for their kindly consideration in coming to a decision, some while ago, and at his request, to reconstruct the premises. They felt the act was one that would prove of great value to customers, because it would all tend to better service in every direction. As to the future, he was certain that, with the able co-operation of Mr. Taylor and his excellent staff at the works, and coupled with the splendid administration of the Board of Directors, the Company would continue to manifest the remarkable rate of successful progress which had attended the past.



FASCIA LAMP.—FRONT ELEVATION WITH FRONTISPIECE REMOVED.

EQUIPMENT USED FOR EXTERIOR LIGHTING OF THE WESTON-SUPER-MARE SHOWROOMS.

The outside lighting of the showrooms has been achieved by an original concealed and reflected light. The lamp, designed by Mr. T. W. Luckhurst and carried out in conjunction with Messrs. Foster & Pullen, Ltd., is 24 ft. in length and made in four sections, each section being fastened to the front framework by means of stout wrought-iron bolted supports. The casing of the lamp is made of stout gauge copper throughout. Each section is 6 ft. long by 10 in. high by 10 in. deep, with a 3-in. copper ventilator fluecap on top, making the height, overall, 15 in. Each of the four sections is fitted with ten No. 1 mantles on swan-neck type of burners, every burner being fitted with a gas and air regulator, and also a separate by-pass nipple, adjustable by a regulating screw. The whole of the burners, forty in number, are fitted with a 1-in. supply tube, the by-pass being supplied by a separate ¾-in. iron supply pipe, each section being coupled together by connectors. The lighting and extinguishing are automatically controlled by a Horstmann controller. The method of directing the light on to the fascia board is somewhat unique. Below each burner inside the lamp is a concave removable stainless steel reflector of special design and fixed at a particular angle. The front covering of the lamp is of ornamental ribbed stainless steel, 15 in. high and 24 ft. long. Fitted to this are the doors which open downwards to allow for cleaning. The framework and vents for air are made in stainless steel. In the door frames are fitted horizontal sheets of amber-coloured heat-resisting glass, and through this by the special reflectors fitted inside the lamp the rays of light are reflected direct on cream enamelled 9-in. letters, which are fitted on a black glass fascia, and when illuminated the appearance is very effective, and gives the impression of each letter being illuminated from behind. The whole of the lamp is made waterproof, the top being fitted with troughs tapering to carry off any water at each end of the lamp.

Review of Statute and Case Law of 1931 : :

As Applicable to Gas Undertakings

Where a statutory public utility undertaking was bound, by the terms of the Special Act, to supply energy to any person requiring it (upon entering into an agreement), it was held that a Receiver appointed for debenture holders of a colliery was entitled to a supply notwithstanding that at the date of the Receiver's appointment the colliery was indebted to the electricity supply undertaking. (*Granger v. South Wales Electrical Power Distribution Company, Ltd.*, Chancery Division, Nov. 11, 1930. Reported 1931, 1 Ch. 551.)

On the other hand, it has been held that this case was not applicable where a Receiver and Manager was appointed by the Court and the electricity supply company had no such duties beyond the statutory obligation to give a supply. In these circumstances, the Court ruled that the suppliers may make their own terms on which the Receiver can become entitled to a supply. (*McLintock v. Westminster Electric Supply Corporation*, Chancery Division, May 2.)

Where, for the purpose of a business, inquiry is made of a bank as to the stability of a customer of that bank, the only duty (if any) owed by the bank to the inquirer is a duty not to be negligent in giving a reply. (*Batts Combe Quarry Company v. Barclays Bank, Ltd.*, King's Bench Division, Oct. 16.)

Company Law.

On a petition for the reduction of the capital of a limited liability company, by means of a return of capital to the shareholders, in pursuance of sec. 56 (3) of the Companies Act, 1929, the Court may direct that the inquiry as to creditors shall be dispensed with. (*Re Antwerp Water-Works Company, Ltd.*, July 7, Chancery Division.)

The view of the Court of Appeal in *re City Equitable Fire Insurance Company* (1925; 1 Ch. 407) that a person is not guilty of wilful neglect or default, within the meaning of the Companies Acts, unless he is conscious that in doing the act complained of he is committing a breach of duty or is recklessly careless (whether it is a breach of duty or not), has been reviewed in a case in which it was held that wilful default is akin to a deliberate fraud, under the Trustee Act, 1925. (*Re Vickery; Vickery v. Stephens*, 1931, W.N. 35.)

A company's Articles of Association provide that one-third of the directors shall retire from office annually, but that a retiring director shall retain office until the dissolution of the meeting at which his successor is elected, and, further, that if the places of any of the retiring directors be not filled up, a retiring director (being willing so to act) shall be deemed to have been re-elected. It has been held, in the High Court, that where a retiring director was not re-elected, but at the same meeting his place was not filled up, he retains office until his retirement by rotation. By virtue of the last-mentioned provision of the Articles, he must be deemed to have been re-elected, and accordingly there was no vacancy to which a successor could subsequently be elected. (*Holt v. Catterall and Others*, Chancery Division, March 17.)

Income-Tax.

The liability to income-tax under Schedule D accrues when once the company has made a profit, although the exact assessment be not computed or agreed until later (thus confirming the decision in *Whitney v. Inland Revenue*, 1926, A.C. 52, that liability to tax does not depend on assessment) and that an indemnity against " all outstanding liabilities " includes the payment of income-tax in respect of profits earned prior to the date at which the transfer was completed. (*United Kingdom Advertising Company, Ltd.. v. Whiting*, Court of Appeal, May 4.)

Where an additional rate is levied on gas consumers by a local authority, under the provisions of the Electric Lighting (Scotland) Act. 1882, for the purpose of liquidating the annual deficits of the electricity department owned by the same municipality, the proceeds of such special levy are receipts liable to income-tax, notwithstanding that the obligation to meet these deficits rests with the Town Council *quâ* local authority, and not *quâ* Gas Commissioners. (*Alloa Town Council v. Inland Revenue*, Court of Session, June 12.)

The principle involved in *Mersey Docks and Harbour Board v. Lucas* (1883; 8 App. Cas. 891) was followed in a case in which the House of Lords affirmed the decision of the Scottish Court of Session (1930; S.C. 850) that the balance of shipping dues levied under a Private Act were properly assessable to tax under Schedule D, notwithstanding that the Conservancy Board was authorized by the Act to determine the purposes to which such surplus should be applied. (*Forth Conservancy Board v. Inland Revenue*, House of Lords, May 11.)

Where a company carrying on a business in Scotland is the owner of the factories in which it is carried on, and pays owner's rates in respect of such factories, it is not entitled to deduct the amount of such rates from the profits taxable under Schedule D. (*Inland Revenue v. Scottish Electric Power Company*, House of Lords, March 13.)

A voluntary pension on retirement, of which payment may be discontinued at any time, is not assessable to income-tax in the hands of the recipient—confirming the decision in *Benyon v. Thorpe*, 1928, 44 T.L.R. 610. (*Stedeford v. Beloe*, Court of Appeal, May 5.)

On the other hand, a lump sum paid to a Director on retirement, as compensation for loss of office—and so described in the company's Articles of Association—is assessable on him as income for the year of receipt. (*Henry v. Foster*, Court of Appeal, May 1.)

The decision of the Court of Appeal in regard to Unemployment Grants has been upheld by the House of Lords, and it may now be definitely regarded as settled law that, in similar circumstances, a grant approved by the Unemployment Grants Committee from the Treasury is not income liable to income-tax in the hands of the undertaking by which it is received. (*Crook v. Seaham Harbour Dock Company*, House of Lords, Nov. 24.)

An additional assessment under section 125 of the Income-Tax Act, 1918, is competent only when new facts are discovered by the Inland Revenue Authorities, and a mere change of opinion regarding facts existing at the date of the original assessment is insufficient to justify a re-opening of an assessment. (*Anderton & Halstead, Ltd., v. Birrell*, King's Bench Division, June 16.)

Rating.

Where it was estimated that the first year's working of a newly established Municipal Electricity Undertaking would result in a loss, a nominal valuation was agreed to by the Banffshire (Scotland) Valuation Appeal Court. (*Re Buckie Electricity Undertaking*, September.)

Every separate hereditament of a public utility undertaking valued for rating purposes on the " profits principle " approved in *Kingston Union Assessment Committee v. Metropolitan Water Board* (1926) must be treated either as wholly directly productive or as wholly indirectly productive, and the value of an indirectly productive hereditament cannot be increased solely by reason of the fact that it is in some particular directly productive, in that bulk supplies may be taken therefrom. (*Manchester Corporation Water-Works v. Bolton Assessment Committee and Others*, King's Bench Division, Dec. 16, 1930—reported 1931 T.L.R. vol. 47.)

Gas undertakings are still debarred from participation in de-rating relief under the Rating and Valuation (Apportionment) Act, 1928, but possible exceptions were noted in the " Journal " for April 1 (p. 26) and Sept. 2 (p. 525).

STATUTES OF 1931.

Finance (*No.* 1) *Act.*—The provisions of this Act were summarized on p. 369 of the " Journal " for Aug. 12, and the following points are to be specially noted: The construction of Rule 20 of the Income-Tax Act (deduction of tax from dividends and interest paid out of profits) is clarified (sec. 7). Tax assessed on individuals under Schedules B, D, and E becomes payable, as from 1932, on Jan. 1 and July 1 in each year, as to three-quarters and one-fourth respectively (sec. 8). The Land Values Tax is imposed as from the year 1933-34 (sec. 10). but statutory gas companies are exempted (sec. 24). (The valuation of land for the purposes of this new tax has been temporarily suspended.)

Finance (*No.* 2) *Act.*—The standard rate of income-tax for the year 1931-32 (effective retrospectively to April 6, 1931) is increased to 5s. in the £, and provisions are included for the adjustment of future dividends (other than preference dividends provided for by sec. 12 (4) of the Finance Act, 1930) where payments have been made under deduction of tax at the rate of 4s. 6d. in the £. as previously imposed by the Finance (No. 1) Act, 1931. Personal allow-

ances are reduced, but the earned income allowance is increased. The rates of sur-tax are increased by 10 p.ct.

Gold Standard (Amendment) Act.—The operation of sec. 1 (2) of the Gold Standard Act, 1925, is suspended, and in pursuance of the Act the Treasury has issued an Order (dated Sept. 22) prohibiting the purchase of foreign exchange or transfer of funds except for the purpose, *inter alia*, of financing normal trading requirements and of contracts existing before that date.

Expiring Laws (Continuance) Act.—The Coal Mines (Minimum Wages) Act, 1912, Unemployment (Relief Works) Acts, 1920-1930, Dyestuffs (Import Regulation) Act, 1920, and Mining Industry Act, 1926, are continued in force until Dec. 31, 1932.

National Economy Act.—Under this Act has been issued the Unemployment Insurance (National Economy) Order, 1931, by virtue of which the rates of unemployment insurance contributions were increased as from Oct. 5 as shown in the next column.

The Regulations (No. 1699 of 1921) issued by the Board of Inland Revenue under the powers conferred by sec. 32 of the Finance Act, 1921—as extended by sec. 19 of the Finance Act, 1930—are amended in so far as they refer to the tax to be deducted from contributions withdrawn from an approved Superannuation Fund (Statutory Rules and Order No. 638 of 1931).

Class.	New Rates.	Amount which may be Deducted from Wages.
	s. d.	d.
Man	1 8	10
Young man	1 6	9
Boy	0 10	5
Woman	1 6	9
Young woman	1 4	8
Girl	0 9	4½

The Minister of Health has authorized the publication and circulation to rating and other local authorities of a resolution of the Central Valuation Committee regarding the valuation for rating purposes of gas undertakings extending into the area of more than one rating authority. ("JOURNAL" for Sept. 23, p. 719.)

TIME'S CHANGES

BY THE EDITOR

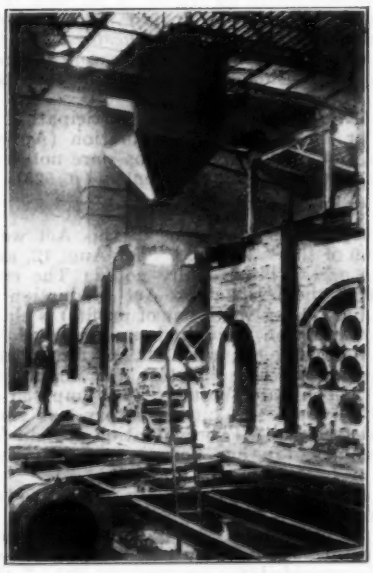
An Example in the Carbonizing Plant of the Croydon Gas Company

While watching the admirable series of slides with which Mr. Walter Grogono, Engineer to the Croydon Gas Company, illustrated the paper on Intermittent Vertical Chambers presented by him at the November meeting of the Southern Association, the writer was reminded of a certain photograph which has reposed in his album at home for nearly forty years, and which has been preserved through all this time for a personal reason. This reason, it may be explained, even though the explanation be a confession of vanity, is that he himself—he joined the staff of the "JOURNAL" a good many years before that—appears in the picture, which was taken at the Croydon Gas-Works, the photographer being the late Arthur F. Bezant.

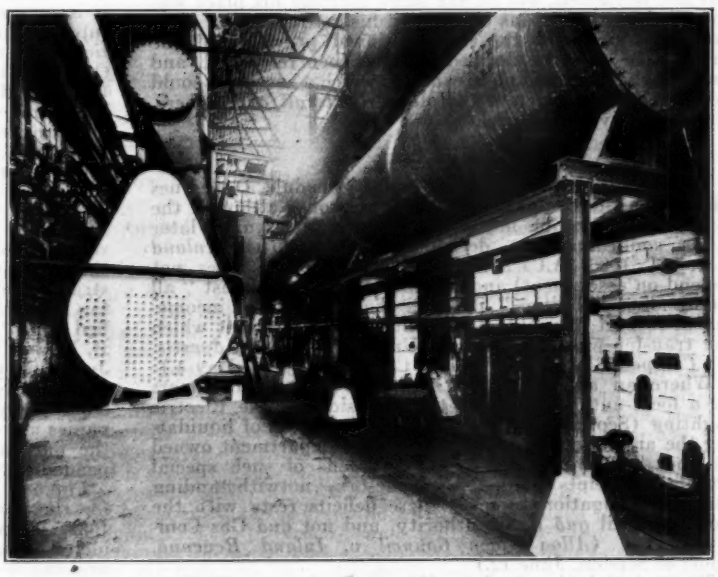
The photograph referred to is the small one on the left-hand side of the first illustration, and it was taken during construction by the then Engineer (James W. Helps) of a stage floor retort house with a coal-store adjoining. This was a substantial brick building, erected by Messrs. J. Aird & Co., 196 ft. in length—the retort house being 72 ft. wide and the coal-store 50 ft. Regenerative settings were adopted—five being on Mr. J. West's principle, with eight through retorts in a bed, and five on Mr. G. Winstanley's plan, each containing nine through retorts. In the West settings there was a generator on either side, while one generator did duty for both sides of the Winstanley settings. The retorts, it will be seen, were D-shaped, 20 ft. by 16 in. by 22 in. At the end of 1893 only two-thirds of the house was occupied, but it was estimated that it would even so produce 1,200,000 c.ft. of gas per day. Hydraulic mains were on both sides of the benches, which were fitted with Livesey & Tanner's tar-overflows. West's manual charging and drawing machines were adopted, and in the coal-store was one of West's coal-breaking and elevating machines, which delivered the coal into two large overhead hoppers (the one on the far side being supplied by means of an endless-band conveyor), from which the chargers were filled.

In 1904, No. 4 retort house was erected, and this and No. 3 house (the one above referred to) were thrown into one; there being altogether fifteen settings on the Drake regenerative system and fourteen settings on the West system—all of eight retorts in three tiers, 20 ft. through. Thus at the end of 1927, when a further re-modelling scheme was decided upon, the house contained 232 retorts, drawn and charged by West's compressed air stoking machines, and producing approximately 3,500,000 c.ft. of gas per day.

Mr. Grogono's wonderful series of slides showed what the same spot looks like now. As he said in his paper, when all the conditions at Croydon were considered, it was decided to put in intermittent vertical ovens. The next step was to obtain a plant which would be built of British materials and entirely by British labour, and it



1893.—Regenerative Settings and Manual Charger.



1931.—Woodall-Duckham Intermittent Vertical Chambers; Waste-Heat Boilers and Furnace Fronts.

TWO PHOTOGRAPHS TAKEN ON THE SAME SITE AT THE CROYDON GAS-WORKS.

WOODALL-DUCKHAM INTERMITTENT VERTICAL CHAMBERS AT CROYDON.

was determined to place the order with the Woodall-Duckham Vertical Retort and Oven Construction Company (1920), Ltd. One-third of the horizontal setting was pulled out and one section of intermittent ovens built, with a carbonizing capacity of 240 tons of coal per day. This left sufficient space in the retort house to install at a later date two more sections of similar plant when required; and the second section was put in hand last March to be ready for work by the winter of 1932. An example of Time's changes.

CONTINENTAL NOTES

INTENSIVE COOLING OF GAS BY THE LENZE PROCESS.

The subject of intensive cooling of gas for removal of moisture, ammonia, and naphthalene has already been referred to in the "JOURNAL" (Vol. 192, p. 793, Dec. 10, 1930).

In "Das Gas- und Wasserfach," 1931, 74, 1169—1172 (Dec. 19), Lenze and Rettenmaier give an illustrated account of the installation at the Thyssen gas and water works at Hamborn with a daily capacity of 42 million c.ft. of gas. The general principles of the plant are similar to those previously described. The refrigerant employed is ammonia working on the absorption principle, this system being advantageous in gas-works and coke oven plants since waste heat may be employed for working it. The sensible heat of the gases leaving the setting may also be made use of for supplying the necessary heat to the refrigerating unit, the gas being at the same time cooled. The intensive cooling process commences at the stage at which the gas has already been cooled to 77° Fahr. in the summer or to 68° Fahr. in winter and effects further cooling to 32° Fahr. with consequent dehydration of the gas and the securing of the advantages resulting from this dehydration. The extra amount of heat required to be removed from the gas for cooling from 77° to 32° Fahr. is only about 4 p.ct. of the total heat which has in any case to be abstracted in normal gas-works operation.

The ammonia content of the gas is reduced to less than 1 grain/100 c.ft., and the ammonia liquor obtained is of 8½—13 oz. strength. The naphthalene content ranges from 0·5 to 1·3 grains/100 c.ft., corresponding with saturation at a temperature well below 32° Fahr. This low figure is due to the deposition of a small amount (about 1 grain/100 c.ft.) of heavy benzole hydrocarbons in the scrubber cooler, and the hydrocarbons at the same time bring down the naphthalene and keep it dissolved.

The installation of the intensive cooling plant at the outlet of the coolers is generally the most suitable plan since advantages are thus gained in the ammonia, benzole, and purifying plant. However, in some cases in which, due to climatic conditions, an ultra dry gas is desired, the intensive cooling plant may be between the station meter and the holder. In the purifier, the dried gas takes up some water. Where high-pressure gas is distributed, intensive cooling should follow compression since otherwise naphthalene may be deposited in the pressure main.

The cost of intensive cooling involves capital charges, cooling water, power for pumps, make up ammonia for the refrigerator, maintenance, repairs, and labour.

For a plant cooling 3½ million c.ft. per day from 68° Fahr. to 32° Fahr., the capital cost would be £5000 including buildings, foundations, insulation, &c.

The daily costs would be as follows:

	s.	d.
Capital charges (15 p.ct.)	41	1
Cooling water at 60° Fahr., 100,000 gallons at 2¾d. per 1000 gallons	22	11
Power, 168 KW.-H. per day at ⅜d. per KW.-H.	8	9
Labour, 6 hours at 1s. per hour	6	0
Make up ammonia, 2·2 lbs. at 6d. per lb.	1	1
Maintenance, repairs, lubrication, illumination (3 p.ct. on capital cost)	8	3
Waste steam, 8 tons, available without cost		
	88	1

The total cost is thus 0·3d./1000 c.ft., but this is more than regained by the savings effected, since intensive cooling results in almost complete removal of tar fog, naphthalene, and ammonia in a single operation, and tar extractors, and naphthalene and ammonia washers and their operating costs are eliminated. The high concentration of the liquor produced reduces distillation costs and the benzole wash oil has a longer life. Intensive cooling permits activated charcoal to be employed for benzole recovery, and irregularities in purification are eliminated owing to the absence of tar and naphthalene deposition, the life of the oxide being increased and the sulphur recovered by extraction commanding a higher price in view of its clean colour. Other advantages are realized in the distribution mains, since the pumping of syphons and naphthalene troubles are eliminated.

THE "JOURNAL" TECHNICAL RECORD

Which contains Reports of Meetings of Gas and Allied Associations

Steaming in Continuous Vertical Retorts

By M. BARASH, Ph.D., M.Sc.Tech., F.I.C., and T. A. TOMLINSON, M.B.E., M.I.Mech.E., M.Inst.Gas E., both of West's Gas Improvement Company, Ltd., Manchester.

[From a Paper presented at the Third International Conference on Bituminous Coal at the Carnegie Institute of Technology, Pittsburg, November, 1931]

Although the continuous carbonization of coal, particularly in vertical retorts, had figured on the patent records for many years it was not until the early years of the present century that the process was successfully realized on a practical scale. The vertical retort itself was first largely used in Germany for intermittent carbonization, but it was in England that the continuous process in the vertical retort was introduced and brought to such a state of perfection that it is estimated that at the present time over 60 per cent. of the gas made in Great Britain is produced in this type of apparatus. This development has taken place within the last 25 years.

The advantages of such a system are fairly obvious, and they have been fully realized in practice. Coal is passed continuously into the retort at the top, and the cool residual coke is discharged from the base without emptying the retort, without interruption of the process and with the entire avoidance of the nuisances inseparable from bulk charging and discharging. Every portion of the charge receives the same treatment as every other portion.

The system is a complete solution of some of the problems which have never been dealt with successfully in any of the intermittent systems so far designed. These include the unavoidable difficulty of the different treatment to which the " ends " of the charge, whether vertical or horizontal, are subjected as compared with the " middle " of the charge and the not less troublesome difficulty of ensuring an even distribution of temperature and pressure throughout the length and area of the retort or oven side. And the refractory material of which the continuous retort and its setting are constructed is maintained, as regards any particular portion of it, under practically constant temperatures, thus obviating the damage caused by the alternate rise and fall of temperature which is inseparable from retorts or ovens which are subject to continually fluctuating heat conditions.

The incidental advantages are also considerable. The gas value is constant both as to composition and as to quantity produced hour by hour. It follows that gas can be manufactured with a very much less margin above the penalty line than is possible with intermittent systems, in which reliance must be placed upon " staggering " the times of charging the several units and mixing in the gasholders to ensure some approach to constant output.

Gas from a continuous vertical-retort house passes through the purification apparatus at a constant rate, so that the latter need be designed only for the average hourly rate of the maximum day's output instead of being sufficient to cover the peaks of a varying output. The flexibility of the continuous retort is considerable, so that the process can be speeded up or slowed down to meet fluctuations in demand without interfering with retort house routine and with an appreciable influence on the gasholder capacity necessary.

The consumer is more contented with a gas of constant composition and calorific value, and, above all, with the complete freedom from naphthalene, another important feature which characterizes the gas produced in the continuous vertical retort. And the citizens who live near the gas-works are deprived of a grievance at the periodic emission of volumes of steam and smoke which are so objectionable a feature of systems of intermittent bulk charging, and the discharging and quenching of incandescent coke with water, conditions which are completely absent from works using continuous verticals. In this age of demand for a smokeless city, the continuous vertical retort has realized the smokeless gas-works. And this feature alone has enabled many gas-works to be carried on within districts which have assumed a residential character, particularly in seaside and holiday resorts, saving in a large number of cases the heavy expenditure which would have been involved had it been necessary to remove the works. A similar advantage accrues from the extremely small ground area upon which modern continuous vertical retort plant can be placed, and, in many cases, the adoption of one or other of these systems has resulted in big extensions of carbonizing plant being carried out without increasing the area occupied by the works. In fact, whenever extensions have to be effected on an existing congested site, the continuous vertical retort is the only possible solution of the problem.

[The continuous system was then described.]

THE CALORIFIC STANDARD.

The calorific standard for gas supply was introduced in England as long ago as 1909, when the Gas Light and Coke Company, London, at that time, and probably still, the gas undertaking with the greatest output in the world, was authorized to supply gas at a calorific value of 125 calories (= 496 B.Th.U.) net per cubic foot. By that time, the proportion of gas sold for cooking and heating had increased so rapidly in relation to that sold for lighting, and even as regards the latter, the adoption of the incandescent burner had become so general, that the illuminating standard had become an absurdity. But it required long and persistent efforts on the part of gas undertakings in England to obtain the abolition of the illuminating standard.

The first line of attack was directed to securing a reduction in the illuminating standard, and particularly in the modification of the test burner which resulted in the substitution of the Metropolitan Argand No. 2 burner for the old London Argand No. 1. The reduction of the candle-power to 14 on the new burner represented a much greater relief than appears from the actual figures.

By 1913 most of the gas supply in London and in a considerable number of provincial towns was subject to a calorific value standard, and during the war, owing to the demands for benzol and toluol and to the imperative necessity for the ever decreasing consumption of coal, not only did the calorific value standard become general and compulsory, but this standard itself was reduced to a very low figure.

The reduction had been followed by no very considerable inconvenience to the consumer, and in 1918 steps were taken first by the Gas Investigation Committee of the Institution of Gas Engineers, and secondly by the Fuel Research Board of the Department of Scientific and Industrial Research to look into the effect on efficiency of reducing the calorific value of the gas.

The exercise of the privileges under the Gas Regulation Act has resulted in a very wide choice of calorific value standards. Figs. 1 and 2 show the distribution of declared values in Great Britain as given in the Board of Trade Returns (1930) arranged on the basis of individual undertakings and of volume of gas supplied respectively.

The average declared calorific value of the gas supply in Great Britain is approximately 480 B.Th.U. per cubic foot gross. Though the declared values range from 200 to 600 B.Th.U. it will be seen that the values for the vast majority of undertakings and the great bulk of the gas supplied lie between 450 and 500 B.Th.U., and that the single value

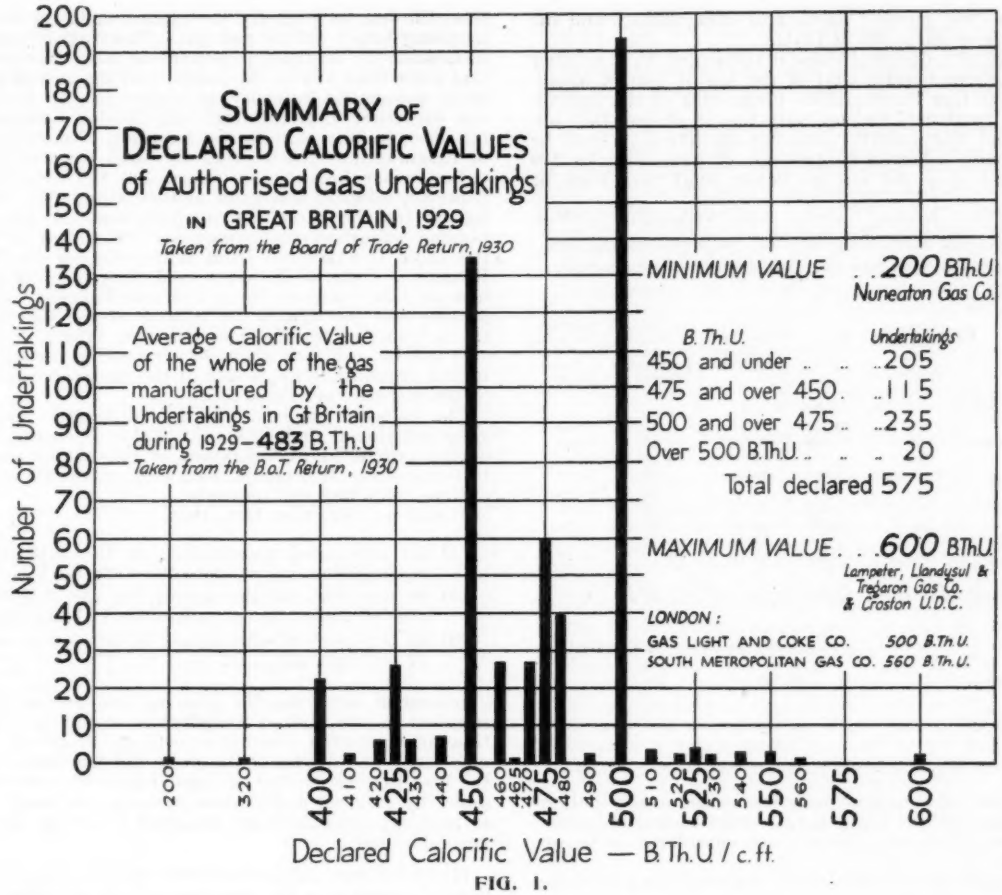

SUMMARY OF
DECLARED CALORIFIC VALUES
of Authorised Gas Undertakings
IN GREAT BRITAIN, 1929
Taken from the Board of Trade Return, 1930
Average Calorific Value of the whole of the gas manufactured by the Undertakings in Gt Britain during 1929 – 483 B.Th.U
Taken from the B.o.T. Return, 1930
MINIMUM VALUE . . 200 B.Th.U
Nuneaton Gas Co.
B. Th. U. Undertakings
450 and under 205
475 and over 450. ..115
500 and over 475.. ..235
Over 500 B.Th.U. 20
Total declared 575
MAXIMUM VALUE . . .600 B.Th.U.
Lampeter, Llandysul & Tregaron Gas Co. & Croston U.D.C.
LONDON :
GAS LIGHT AND COKE CO. 500 B.Th.U.
SOUTH METROPOLITAN GAS CO. 560 B.Th.U.
Number of Undertakings
Declared Calorific Value — B. Th. U. / c. ft.

FIG. 1.

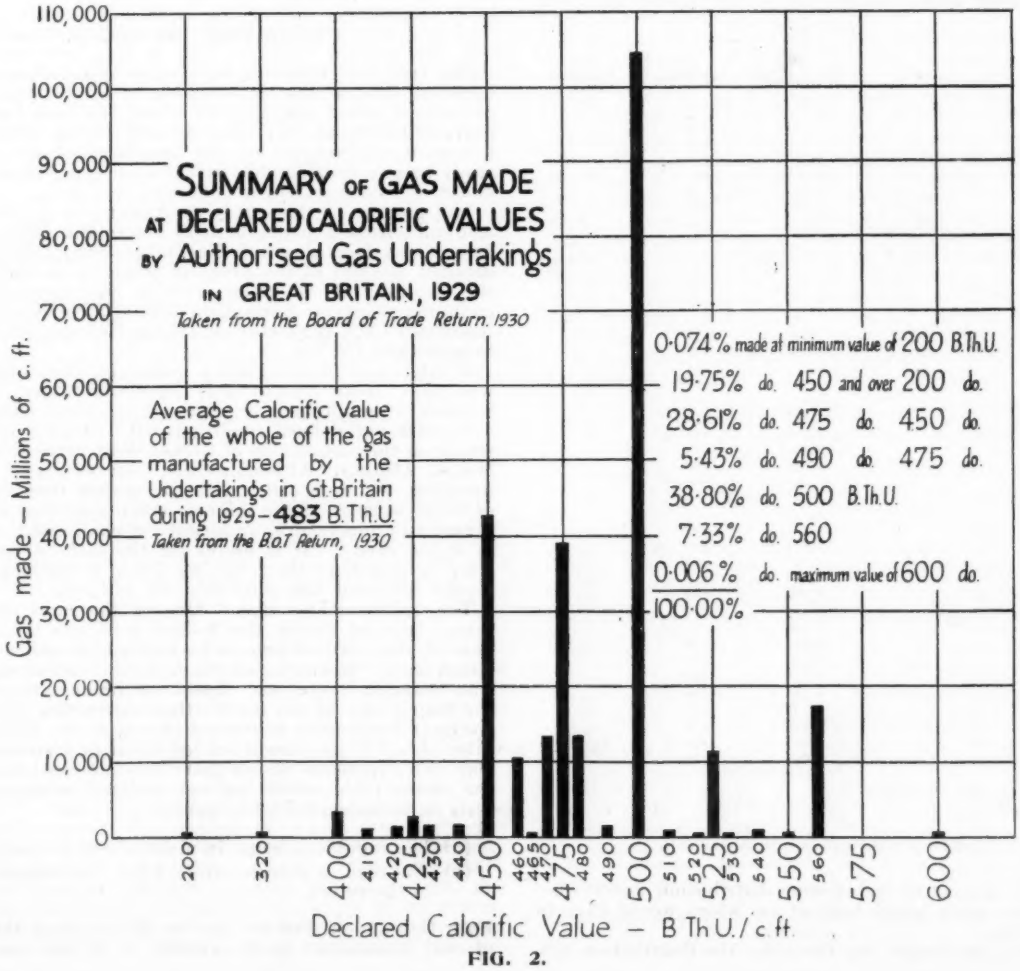

SUMMARY OF GAS MADE
AT DECLARED CALORIFIC VALUES
BY Authorised Gas Undertakings
IN GREAT BRITAIN, 1929
Taken from the Board of Trade Return. 1930
Average Calorific Value of the whole of the gas manufactured by the Undertakings in Gt Britain during 1929 – 483 B.Th.U.
Taken from the B.o.T. Return, 1930
0·074% made at minimum value of 200 B.Th.U.
19·75% do. 450 and over 200 do.
28·61% do. 475 do. 450 do.
5·43% do. 490 do. 475 do.
38·80% do. 500 B.Th.U.
7·33% do. 560
0·006% do. maximum value of 600 do.
100·00%
Gas made – Millions of c. ft.
Declared Calorific Value – B Th U. / c ft.

FIG. 2.

which claims the greatest number of undertakings and the greatest bulk of gas is 500 B.Th.U.

The choice of a declared value is influenced by a number of considerations besides that of the lowest cost of manufacture. The Gas Investigation Committee of the Institution of Gas Engineers had no hesitation in stating that appliances, and particularly domestic appliances, could be readily enough adapted to the use of gas down to 400 B.Th.U., but they did not go below what may thus be

TABLE A.—*Tables Showing Calorific Value Standards and Other Details of the Gas Supplied by the Three Metropolitan and Six Principal London Suburban Gas Companies for the Year 1930.*

—	Declared Calorific Value. B.Th.U.	Gas Used in Millions of C.Ft.	Gas Made in Therms per Ton.	Net Cost of Manufacture in Pence per Therm.	Percentage Volume of Water Gas in Total Make.
Gas Light and Coke Company	500	49,544	72·66	3·91	23·94
South Metropolitan	560	16,886	76·29	3·98	None
Commercial	500	3,824	73·20	3·25	0·42
South Suburban*	500	4,041	72·89	4·48	None
Wandsworth	470	3,833	71·51	4·43	14·05
Tottenham	500	3,439	73·14	4·81	10·01
Croydon	500	2,878	72·37	3·67	26·91
Lea Bridge	500	988	80·19	4·43	31·74
Hornsey	500	860	69·86	4·15	36·18

* An unknown quantity is sold by the South Suburban Gas Company at 560 B.Th.U

—	Millions of C.Ft.	P.Ct. of Total.
Total volume sold	86,293	..
Volume sold at 560	16,886	19·6
,, ,, ,, 500	65,574	76·0
,, ,, ,, 470	3,833	4·4

considered for all practical purposes as the lower limit of calorific value for gas for general domestic and industrial consumption. Even this limit is not considered to be ap-

TABLE B.—*Table Showing the Calorific Standards of 34 Provincial Gas Undertakings with an Annual Sale of 1000 Million C.Ft. and Upwards.*

—	Annual Sales in Millions C.Ft.	Declared C.V.	P.Ct. of Total.
Derby	1,891	500	..
Sheffield	5,056	500	..
Sunderland	1,372	500	..
Bradford	1,988	500	..
Salford	1,823	500	..
Aberdeen	1,689	500	..
Edinburgh	3,102	500	..
Total at 500	16,921		17
Bath	1,243	480	..
Bristol	3,931	480	..
Liverpool	7,547	475	..
Northampton	1,026	470	..
Preston	1,000	480	..
Dublin	2,179	475	..
Birmingham	14,315	475	..
Coventry	2,443	480	..
Leeds	2,877	470	..
Nottingham	2,939	475	..
Oldham	1,564	475	..
Glasgow	8,978	470	..
Total 470–480	50,042		50
Bournemouth	2,421	450	..
Hull	1,914	460	..
Plymouth	1,845	450	..
Portsmouth	2,632	450	..
Reading	1,292	460	..
Southampton	1,485	460	..
Wolverhampton	1,239	450	..
Birkenhead	1,292	450	..
Blackpool	1,118	450	..
Bolton	1,251	450	..
Leicester	2,793	450	..
Manchester	7,195	450	..
Dundee	1,705	450	..
Belfast	4,107	450	..
Blackburn	1,043	425	..
Total 450–460 (including 1 at 425)	33,332		33

Total for 34 undertakings - 100,295 millions.

proachable in most of the existing distribution systems because of the much larger bulk of gas which would have to be dealt with.

Generally, the larger and the older the distribution system, the less its capacity for expansion in the direction of handling larger volumes of gas. The distribution systems in London are a striking instance of this. They are larger and older than any in the world, and the cost of increasing their volumetric capacity is enormous. It is, therefore, not surprising that although the London Companies have not been unduly slow in the adoption of modern methods of manufacture which generally tend towards a calorific value rather below than above 500 B.Th.U., they have generally adopted this value as their standard. The actual figures for the three Metropolitan and the six principal London suburban gas companies are shown in Table A; the table is extracted from that compiled by Mr. F. J. Bradfield, General Manager and Secretary of the Commercial Gas Company (*Gas Journal*, February 25th, 1931, p. 506) and the figures for volume of gas sold have been taken from the *Gas Journal Calendar* (1931).

It will be seen that about 76 per cent. of the gas supplied in and around London is sold at the declared calorific value of 500 B.Th.U. per cubic foot.

The calorific value standard is distinctly lower in the great provincial undertakings. Table B covers the whole of the provincial undertakings of importance comparable to those of the Metropolis, *i.e.*, with an annual sale of 1000 million cubic feet and upwards.

It will be seen, therefore, that:

(1) No provincial undertaking of the first importance is supplying gas at more than 500 B.Th.U.

(2) 50 per cent. of the supply by the important provincial undertakings ranges from 470 to 480 B.Th.U.

(3) 33 per cent. of the supply is below this range and 17 per cent. above it.

Inasmuch as a rapidly growing proportion of the gas supplied in the United Kingdom is manufactured in continuously-operated vertical retorts we think the inference may safely be drawn that, given the freedom allowed by the Gas Regulation Act of 1920, and within the limits imposed by existing distribution systems, the most generally satisfactory calorific value standard is near to 475 B.Th.U. per cubic foot.

[Here followed an account of the introduction of the practice of steaming in the continuous vertical retort.]

STEAMING ABROAD.

The fact that steaming in vertical retorts has not been confined to Great Britain is evidenced by the large number of vertical retort installations which has been built in all parts of the world. Judging, however, from published information, the subject has not been pursued as a scientific study to any considerable extent except in Great Britain, and to a smaller extent in America.

The pioneer of this study in America is L. J. Willien, who submitted a paper in 1919 before the American Gas Association (*Gas Journal*, November 18th, 1919) giving a detailed account of the progress made up to that time in the steaming of American coals in all types of retort—including plants at Springfield (Mass.), Portland (Maine), Rochester (N.Y.), Pawtucket (R.I.), Holyoke (Mass.), and Schenectady (N.Y.).

A later and more valuable paper by the same author was that (*Gas Age-Record*, Februarv 20th, 1926) describing a comprehensive series of steaming tests carried out under well-defined conditions with varying amounts of steam on the installation of Glover-West vertical retorts at Malden (Mass.). Although these tests were only of short duration, we must agree with the author that they "are of value because of the uniform conditions that existed in regard to temperature, uniformity of coal, and the amount of steam used." It is useful for the sake of comparison later to give here the following Table C summarizing the results obtained and published by Willien.

The author states that "One of the most interesting things brought out by the Malden tests was the *sensitiveness* of the vertical retorts to changes in the amount of steam used. In every case when the amount of steam used was changed, there was almost an immediate change in the hourly rate of gas made—the calorimeter (Thomas recording) would show a gradual change in the B.Th.U., but after about 45 minutes it settled down to a straight line." Our own experience shows that there are two anomalies in the above table which are not realized in longer period tests on an industrial scale, namely:

(*a*) The regular increase in make of gas per retort, and

(*b*) The regular deterioration of the "water-gas" made in the retort.

Both these anomalies are due to the constant throughput of coal maintained in the retorts at Malden, in spite of

increased steaming. There is no doubt that this throughput cannot be maintained for any length of time without the " heats " suffering, and has to be regulated according to the amount of steam supplied, otherwise the percentage

TABLE C.—*Steaming American Coal at Malden (Mass.).*

L. J. WILLIEN.

Test	A	B	C	D	E
Steam used, p.ct. of coal carbonized	*Nil*	3	8	13	18
Gas—					
Hourly make, million c.ft.	63	74	78	84	88
P.ct. increase	..	17·5	23·8	33·3	39·7
B.Th.U. per c.ft.	550	515	510	500	490
B.Th.U. per lb. of coal	3,000	3,290	3,435	3,625	3,720
= c.ft. per ton (E) coal	12,200	14,300	15,100	16,200	17,000
Gas analysis—					
CO_2, p.ct.	1·3	2·4	3·6	4·6	5·4
O_2, ,,	0·6	0·5	0·3	0·6	0·4
C_nH_m, ,,	2·7	2·6	2·4	2·4	2·6
CO, ,,	8·0	12·3	12·4	13·2	13·2
CH_4, ,,	30·3	27·4	26·5	24·3	20·9
H_2, ,,	53·6	53·6	53·0	53·9	51·8
N_2, ,,	3·5	1·2	1·8	1·0	5·7
Composition of water gas made in retort, calculated from above—			" Added Gas "		
CO_2, p.ct.	..	9	13	14	16
CO, ,,	..	37	30	29	26
H_2, ,,	..	54	57	57	58
B.Th.U. per c.ft., calculated	..	291	278	275	269
Steam, lbs. per 1000 c.ft. of water gas made	..	33	63	74	87
Carbon, lbs.	..	14·6	13·8	13·6	13·4
P.ct. of steam decomposed	..	79	43	37	32
P.ct. reduction in coke yield	..	2·3	3·0	4·3	4·9
Lbs. of coke utilized per 100 lbs. of coal	..	0·50	0·55	0·74	0·84

of steam decomposed falls rapidly, resulting in the evils of " over-steaming," *i.e.*,

Reduced yields of gas.
Difficulty in maintaining constant calorific value.
Green (smoky) discharges.
Salts and pitch in the mains, and
Unattractive coke.

In this respect the results obtained in the tests at H.M. Fuel Research Station have suffered from a similar drawback, the throughput of coal per retort having been kept constant instead of being adjusted at each C.V. for optimum yields per ton of coal and per retort. (See later.)

THE STEAMING REACTION—NATURE OF THE " ADDED " GAS.

A vast amount of data has accumulated from the researches and investigations of a considerable number of authors with regard to the theoretical considerations underlying the steaming process, or concerned with the ramification of the reaction between carbon and steam under varying conditions.

It is intended here to deal only with the main generalizations in so far as they concern the production of the nearest approach to a perfect water gas (50 per cent. each of CO and H) by the reaction of steam with red-hot coke in the retort.

The ideal reaction aimed at is represented by

$$C + H_2O = CO + H_2.$$

It has, however, been abundantly realized and must be particularly stressed that this reaction is only successful from the gas yield point of view under the modern conditions of high temperature carbonization. For the true water-gas reaction to take place successfully, the temperature of the reacting substances must be maintained at a minimum of 1000° C., preferably at 1100° C., otherwise the reaction

$$C + 2H_2O = CO_2 + 2H_2$$

apparently takes place, leading to the introduction of the inert gas CO_2 into the gas stream, a condition which must be avoided for several obvious reasons. Furthermore, at the lower temperatures, only a portion of the steam is decomposed; the remainder, passing through the reaction zone, removes valuable heat and has to be dealt with in the ancillary plant following the reaction unit.

It must be stressed again that the term " reaction temperature " must be differentiated from combustion chamber temperature. The latter, of course, refers to the temperature of the outer surface of the retort: the inner surface is normally from 200° C. to 250° C. lower than this, while the temperature of the charge will range from this lower temperature to one considerably lower at the centre. It will be clear that in order to obtain optimum steaming conditions, the steam after entering the retort will also have to be heated up to about 1000° C. before it comes into contact with the coke at the reaction zone.

The heat for this purpose is obtained from the coke prior to discharge in the combined perfect regenerating and dry quenching process represented by the modern vertical retort.

To ensure obtaining a high enough temperature in the charge, considerable research in refractories has resulted in the evolution of the modern silica retort, and the tendency in modern steaming practice is, therefore, to carry temperatures of 1300° C. to 1400° C. in the combustion chambers, particularly round and immediately above the effective steaming zone, corresponding to a temperature between 1100° C. and 1200° C. in the coke inside the retort.

Under these conditions, the main factors entering into the water-gas reaction may be summarized and represented briefly as follows:

$$C + H_2O = CO + H_2$$

12	18·016	28	2·016	Parts by weight
	1 (steam)	1	1	Parts by volume
		(at the same temperature and pressure)		
1 lb.	1·501 lb.	32·1 c.ft.	32·1 c.ft.	
		Yield at 60° Fahr. and 30 in. saturated		
15·6 lb.	C.	1000 c.ft.		

(Cal. value of theoretical water gas—321 B.Th.U. per c.ft.).

It is well known that the above equation does not represent a condition of equilibrium, as heat has to be supplied to bring about the reaction. The amount of heat absorbed in this reaction is in the neighbourhood of 65,000 B.Th.U. per 1000 cubic feet of water gas made, but it will be shown later that there is sufficient heat in the red-hot coke produced by carbonization to provide for the generation of considerable volumes of water gas.

From the above data it is a simple matter to calculate the theoretical yields of gas at any calorific value obtainable by steaming a coal which gives a definite or known yield without steaming: in other words, to determine the increment of water gas to be added to the straight coal gas yield to produce a pre-determined C.V. of gas or yield of gas per ton in cubic feet or in therms.

It is remarkable how closely in many cases the actual results obtained in practice, even in the earliest experiments on steaming, coincide with the values for gas makes and thermal yields calculated from theoretical data. In cases of more or less serious discrepancy, these can readily be explained, where data are available, by an analysis such as the one given later.

Particularly in Great Britain, a considerable number of series of results of steaming tests have been published. Reference can only be made here, however, to a few of these, stress being laid particularly upon the conclusions with regard to the nature of the " added " gas (the increment of gas apparently produced by steaming over and above the straight coal gas yielded by simple carbonization) and the extent of success achieved in the steaming reaction as indicated by the amount of steam decomposed as a percentage of the total steam passed into the retort.

In the 1920-21 Report of H.M. Fuel Research Board are given the results of a series of tests on the progressive steaming of Mitchell Main (Yorkshire) coal in continuous vertical retorts, from the production of straight coal gas (no steaming) down to gas of a C.V. of 432 B.Th.U. per cubic foot.

A summary of these results has been abstracted and is reproduced in Table D.

FUEL RESEARCH BOARD—1920-21 REPORT.

MITCHELL MAIN COAL—STEAMING TESTS.

[Additional gas by steaming.]

TABLE D.

Test	D	E	F	G	H
Coal per retort per day, tons	2·52	2·48	2·56	2·48	* 2·51
Av. temp. combustion chambers, °C.	1,267	1,261	1,265	1,248	1,262
Gas per ton, c.ft.	13,100	16,430	20,060	22,580	25,610
C.V., B.Th.U. per c.ft.	544	517	477	460	432
Steam, p.ct.	No steaming	5·06	12·44	20·53	30·03
Gas composition—		Excess gas over dry carbonization			
CO_2, p.ct	0·8	3·7	8·6	9·7	10·5
O_2, p.ct.	0·6	1·1	0·6	..	0·5
C_nH_m, p.ct.	2·2	2·0	0·8	1·3	0·8
CO ,,	7·4	26·7	31·0	32·3	32·8
CH_4 ,,	29·0	13·5	5·9	2·7	3·2
H_2 ,,	52·0	40·4	48·7	51·2	47·3
N_2 ,,	8·0	12·6	4·4	2·8	4·9
Calorific value of " added " gas, calculated	..	401	337	325	311
Steam decomposed, p.ct. of steam to retort	..	100	79	64	52

D actual analysis. E, F, G, H by difference and calculation from respective analyses.

There are several points in these figures to which attention may be briefly directed.

Firstly, the regularly increasing CO_2 content of the "added" gas indicates clearly that the reaction temperature in the retort was too low for the successful production of water-gas, and that this temperature was successively dropping as the throughput of steam *plus* coal was increasing in the series of tests. It is evident that the sum of steam and coal cannot be successfully increased under the heating conditions of the setting, while the combustion chamber temperatures are kept constant and at the rather low average of 1260° C. Furthermore, the composition of the "added" gas and the calorific value both show a comprehensible diversion from true water gas and indicate that, particularly in tests "E" and "F," there was still a considerable additional evolution of "straight" gas above that obtained under the comparatively low temperature conditions of test "D." It is thus apparent that the sum of these causes has influenced the percentage of steam decomposed to the extent shown in the last line of the table.

Referring now to Table C it will be observed that in the case of the series of tests carried out by Willien at Malden, where again the coal throughput was kept constant while the steam was successively increased, the high H_2 content of the "added" gas, the increasing CO_2 content at the expense of the CO giving a correspondingly diminishing calorific value, and the diminishing percentage of steam decomposed, are all attributable to the reduction of temperature in the reaction zone of the retort.

Neither of the above examples can be taken as a true indication of the steaming reaction, or of the nature of the "added" gas.

(To be concluded.)

Western Junior Gas Association

Lantern Lecture by Mr. A. Forshaw

A Meeting of the Association was held in the Showroom of the Bath Gas Company on Saturday, Dec. 19, when Mr. A. FORSHAW, of Messrs. R. & A. Main, Ltd., gave a lecture illustrated by lantern slides on "The Development of the Gas Fire." In the course of this Mr. Forshaw said:

With single radiants, each heated by one flame, aeration must be sought for in order to get the brilliant incandescence that is so attractive to the user. We found we were able to get increased aeration by reducing the internal friction in the burner by various means, the principle one being the use of a venturi tube, or choke, in the inlet tube. This choke has the function of preventing or minimizing eddies in the inlet tube, and so of lessening friction, and although, as its name implies, it is of smaller diameter than the rest of the tube, yet its effect is to increase the quantity of air entrained, and so to increase the aeration of the flames.

If present fire burners are closely examined, it will be found that the shape of the venturi varies considerably from maker to maker. This is probably because even yet the full possibilities of this device are not known to all. Our own choke is so dimensioned and positioned that it allows of considerable latitude in the placing of the injector without interfering with the quality of the flame, whereas some others give the results required of them only when the injector is in one exact position. The advantage of our form is obvious, in that in attaching or replacing the burner or the injector, meticulous accuracy is not necessary, while a chance knock during transit will not spoil the aeration of the fire.

In dealing with the inlet tube it is necessary to say that the first and straight part of it must be at least five or six times as long as its greatest diameter, otherwise the stream of gas and air will not pass smoothly through it, and oscillation will be set up. This causes the flames to alternate between high and lower aeration, and in some cases causes intermittent blowing back of the mixture from the inlet tube entrance, with the subsequent risk of lighting back. Fires suffering from these defects can be cured to some extent by closing in the fender to make a tight fit to the fire and to the hearth, the flow of primary air being regulated by the size of slot cast in the fender. Further precautions are the provision of a small hood or extension backwards from the inlet tube over the injector. If you have a chance of seeing a tight fitting fender of this sort, take it off the fire, and note the behaviour of the flames; you will probably find the effects mentioned which characterize a poorly designed burner. The use of burners with highly aerated flames was, however, impossible until means were found of stopping the roaring or bubbling noise from the flames. Fires from the period of 1910 to 1914 usually had air-sleeves; the burners could be aerated, but the aeration had to be reduced by the sleeve to avoid noise. To-day burners are provided with eddy-filters. It used to be thought that the flame noise was due to poor mixing of the gas and air, so that first a rich and then a poor mixture issued through the teats with a rapid alternation from a long to a short flame. It is now recognized that this is not the case, provided the inlet tube is properly designed. The noise was caused by the mixture eddying as it turned the corners inside the burner, and these eddies made their way to the flames. The perforated steatite plates or metal grids filter out these eddies and allow the flames to burn silently, although highly aerated.

The design of filters is important from the point of view of maintenance. We ourselves have adopted corrugated iron strips as the filtering means, because it is not possible to break such a grid, whereas steatite or the like are brittle. We have also found that there is so much dust and fluff drawn into the burner that it is necessary to have a large area of grid, otherwise it soon becomes choked and the fire spoiled. The free space area of our metal grid is about 7 to 8 times that of the teats, whereas steatite plates so far have only been made with free space of about twice the area of the teats. Our burner, therefore, should run for about four times as long as a steatite burner before requiring attention.

So far the injector has hardly been mentioned. A good deal of the success of the burner depends on its injector. From the point of view of aeration the simpler the injector the better. Thus a plain nipple with a single hole gives the highest possible aeration. Unfortunately it also gives the greatest amount of noise. The noise referred to is not flame noise, which can be dealt with as already described, but a more or less hissing noise due to the passage of the gas through the nipple opening. The higher the pressure at which the gas reaches the injector, the greater is this noise. The lower the pressure the less is the noise, but less is also the aeration. The noise can be reduced by breaking up the gas into several streams instead of one. Here, again, the more it is broken up the less is the aeration. As the number of holes is increased for any given gas rate, another problem appears, and that is the area they occupy and the difficulty of drilling them. Further than that, if very small holes are adopted they easily become obstructed by dust. It will be apparent then that the designing of an injector to give aeration without noise is a very difficult task. It is further complicated by the fact that gas varies in composition, quality, and pressure within fairly wide limits, and therefore adjustments have to be provided to enable equally good effects to be obtained with all qualities. At present we have reached a compromise. We use alternatively a flat-headed injector drilled with fine holes, or a pin with tapered V-shaped serrations or grooves cut along its length. The surface of the pin is in contact with the internal surface of a wide collar, which is part of the body of the injector. The gas, therefore, issues through a longish passage between the V of the groove and the surface of the collar. The pin can be screwed further through the collar and so a wider section of the grooves is exposed and more gas passed. Thus lower or higher calorific value and pressure are simultaneously dealt with, for the position of the pin regulates the volume of gas supplied, and the grooved passage, owing to its resistance or friction, reduces the noise due to pressure.

For very low values an air disc is fitted to reduce the primary air entrained. In mentioning air adjustments of this sort it is necessary to say that they are, of course, negative in their action, that is, they can only reduce the primary air that would otherwise be drawn in by the injector. They have no positive action in forcing into the burner more primary air, the maximum amount of which depends on the injector and burner, and on the specific gravity and pressure of the gas.

Returning to the grooved pin, although it deals satisfactorily with ordinary pressures and calorific values of gas, it requires for very low calorific values the air disc already mentioned. In the same way, for very high pressures we add to it a pressure damper. In injectors using a large number of small holes it is usual to make provision for closing some of these to reduce the gas rate when calorific value is high. The point is that with either pin or holes the fire requires to be supplied with a definite number of

B.Th.U. per hour to give the best results. Experience has shown that this number is about 1900 B.Th.U. net per teat per hour, or 2100 gross. Practically all gases now supplied fall between 400 and 500 B.Th.U. gross per c.ft. So that to give the best results the lower quality will require roughly 5 c.ft. per teat per hour against 4 c.ft. for the higher quality, and the adjustment of the pin or the holes allows this to be easily done. Just as the pin requires the addition of a pressure damper to deal with very high pressures, so also does the drilled hole injector. This is not because it cannot be regulated to give the correct number of B.Th.U. per hour, but because if the pressure is allowed to act directly on the holes or on the pin the noise in the mixing tube is increased above a reasonable amount.

To sum up the function of the various adjustments, the nipple adjustment for cutting down of the quantity or volume of gas by means of stopping up some of the holes, or reducing the area of the grooves in the pin, deals with calorific value; the pressure adjustment deals with mixing tube noise; the air adjustment deals with flame noise or prevents flame being so aerated as to cease to fill the radiants.

All injectors require the nipple adjustment in some form or other. Drilled hole injectors require the pressure adjustment, grooved pins may require a pressure adjustment to deal with abnormally high pressures. All injectors may require an air adjustment to deal with abnormally low calorific value in conjunction with abnormally high pressure.

After tea, provided by the courtesy of the Bath Gas Company, a discussion took place, and Mr. Forshaw was heartily thanked for his interesting lecture.

NOTES ON PLANT AND PROCESSES

"Alfol" System of Heat Insulation.

Of the three methods of heat transference—radiation, convection, and conduction—which have to be taken into account when considering systems of insulation, it is radiation which is the most potent factor in the majority of cases. As a means of counteracting radiation, a material is required with low powers of absorbing and emitting heat, and such a material is found in aluminium, whose bright surface is noted for its high heat reflectivity. This property must not be confused with that of heat conductivity. The metal is, of course, of high conductivity, but its emissivity is extremely low, and its reflectivity high.

Even in the form of paint aluminium retains this quality, which largely accounts for the popularity of aluminium paint for coating water pipelines, vehicle roofs, aircraft fabric, and so on, where a certain amount of protection from heat is desired. It is in the case of polished sheet or foil that the heat reflectivity is greatest, however, and this has been taken advantage of in the transport of petrol, for instance, losses through volatilization being greatly cut down by using aluminium tanks covered only with colourless lacquer. Similarly, aluminium foil has been successfully tried in America for coating oil tanks as a preventative of evaporation and corrosion.

It has for long been known that the heat-conducting capacity of still air is very small, and it was upon the basis of this fact that a series of investigations were carried out some years ago in Germany with the object of developing a new insulating medium combining layers of air with polished metal strips. It was soon discovered that aluminium is peculiarly fitted for use for this purpose, owing to its high heat reflectivity and freedom from tarnishing, its low weight, and the fact that it is available either as sheet or foil or as a sprayed coating. The method of insulation evolved depends upon thin strata of air separated by extremely thin metallic layers, the high efficiency thus obtained arising from the fact that, while radiation is checked by the bright metallic surface, the still air is practically a non- onductor, convection being prevented by the isolation of the different divisions from each other. In the search for the most practicable way of applying this principle thin aluminium sheet was first tried, but it was later perceived that aluminium foil would be a more economical and in many cases a more suitable material to use, and this resulted in the development of the "Alfol" system.

As originally developed, "Alfol" insulation consisted of concentric layers of aluminium foil wound over non-metallic separators. In this form, however, "Alfol" is applicable only to straight pipes or other bodies of regular shape. In view of this limitation, the system was modified to dispense with the separators and to use crumpled foil, as even in this latter simplified form "Alfol" was found to provide perfectly efficacious insulation. The present "Alfol" system may be described as follows: The aluminium foil is obtainable in rolls of handy size, highly polished and ready for application. (Companies for supplying "Alfol" have been formed in many countries, the British one being Alfol Insulation, Ltd., of 216, Victoria Street, S.W. 1.) The foil is approximately 0·0003 in. thick (0·007 mm.), and is embossed with a diamond pattern, which, besides constituting a trade mark, assists in the crumpling operation. The latter is carried out by means of sideways compression with the hands, the crumpled sheets of foil then being wrapped round the body to be insulated, placed upon each other so that only the ridges of the different layers are in contact. Three layers of foil make up about an inch of insulation thickness, and provided that they are applied carefully so as to ensure the retention of the air layers, this amount will frequently suffice for many insulation purposes. The insulation is, of course, protected in the usual way from damage by a strong cover or steel lagging.

Lifting by Modern Methods.

An interesting booklet published by Messrs. Holt & Willetts, who are specialists in lifting and handling appliances, of Cradley Heath, makes the fifth edition of "Lifting by Modern Methods," and is published to celebrate the sixtieth year of the foundation of the business.

Containing illustrations selected as representative of the firm's standard products, the booklet is in itself a record of progress. Electric passenger and goods lifts and winding gear of various types are illustrated; followed by examples of steam-driven lifts and electric friction hoists, both portable and otherwise. For workshop purposes large overhead cranes are shown with various types and numbers of motors. Portable jib cranes, both hand and locomotive operated, are illustrated, together with deck and wharf cranes, and large electric traversers.

Further sections are devoted to cargo, winding, and warping winches, slipway gears, and capstans, electric telphers and hoist blocks, spur and worm geared blocks, &c.

Broadbent Electric Capstans.

After many years carefully studying the severe working conditions of electric capstans in railway sidings, private staithes, wharfs, collieries, steel and iron foundries, stock yards, gas-works, &c., Messrs. Thomas Broadbent & Sons, Ltd., of Central Ironworks, Huddersfield, have developed a standard design embodying many special and distinctive features, which are briefly described in the new edition of their Capstan Catalogue, a copy of which they have forwarded to us.

The catalogue describes and illustrates types of capstans for various duties, and we are informed that the power cost for working a 1-ton capstan is only 4d. per hour, allowing for stoppages and assuming current at 1d. per unit. Two unskilled men only are required—one for working the capstan and one for coupling the wagons.

It is stated that no effort or expense has been spared to make Broadbent capstans high-class machinery, and they can be relied upon to give great satisfaction in efficiency, reliability, and low maintenance cost. Large numbers of these capstans are at work in various parts of the world, and they have proved under actual working conditions extending over a long period of years to fulfil every claim the firm make for them.

Messrs. Broadbent & Sons have experience extending over 40 years in the manufacture of capstans, and are ready at any time to give customers expert advice, both with regard to designs and their economical application.

REGISTER OF PATENTS

Igniting Gas Burners.– No. 356,784.

HORSTMANN, F. O., HORSTMANN, J. H. G., and the HORSTMANN GEAR COMPANY, LTD., all of Bath.

No. 14,515; May 12, 1930.

This invention relates to means for igniting gas burners in which the operation of turning the gas on and off is effected by clockwork mechanism. The object is to provide means for igniting the gas without the aid of a by-pass flame. A wire filament is provided adjacent to the gas burner, suitably protected from damage due to mechanical fracture or excessive heat. This filament is electrically heated during the operation of turning on the cock for the admission of gas to the burner.

Intermittent Vertical Retorts.—No. 357,146.

WOODALL-DUCKHAM (1920), LTD., and DUCKHAM, A. M., both of Victoria Street, London.

No. 18,379; June 16, 1930.

This invention relates to intermittent vertical retorts, and in particular to the cooling of the coke before discharge, the steaming of the coke in the retort, and the heating of the retort. The retort is made considerably longer than the ordinary retort —say, double the length of the latter. The upper portion forms the carbonizing zone and is externally heated, while the lower portion forms the zone in which water gas is produced and the coke is cooled; this zone may advantageously be surrounded by a recuperator.

The method of operation is as follows: The lower portion is filled with coke to a predetermined level which may encroach to any desired extent on the carbonizing zone; then the remainder of the retort is charged with coal and carbonization proceeds in the normal way. When the charge is coked a quantity of coke is discharged from the bottom and the fresh hot coke descends into the lower or recuperator zone, and fresh coal is charged into the upper or carbonizing zone. The heat in the hot coke aids the carbonization of the coal, and as steam is introduced into the hot coke water gas is formed and ascends through the coal, thus also promoting the coking of the coal. By the end of the coking period of the coal in the upper portion of the charge the heat in the coke will have been used in making water gas and the coke will require a minimum of cooling after discharge.

Geysers.—No. 357,629.

EWART, S., of Euston Road, London.

No. 19,452; June 26, 1930.

This invention relates to improvements in gas heated geysers of the type which is thermostatically controlled and wherein the water is heated by passing the same through a relatively small heating chamber, the flow of water from which is controlled by the valve controlling the cold water supply.

There is provided a geyser comprising a tubular chamber of annular form, a thermostatically controlled gas burner, and a valve operable manually and capable of definite positions to cause water to flow in either hot or cold condition or as a mixture of hot and cold water.

Water Boilers.—No. 358,098.

SOUTH METROPOLITAN GAS COMPANY, CHANDLER, D., and THOMAS, J. S. G., all of 709, Old Kent Road, London.

No. 20,242; July 3, 1930.

The object of this invention is to provide a boiler which will allow intense heat to be employed without incurring the risk of serious damage to the metal of the boiler, and at the same time to effect a rapid transference of heat from the gas to the water. A heavy block of metal is employed, the greater part of which is contained within the water space of the vessel.

The lower portion of the metal block is heated by intimate contact with the flame, and the heat is transferred to the water by conduction through the mass of metal. The block constitutes a heat storage device. In order to increase the extent of heating surface, the block is preferably drilled or cored to form passages which are inclined at an angle to the axis of the block, the apex of the angle being above the upper face of the block, and the passages commencing near the base of the block in the cylindrical periphery thereof and terminating in the upper face.

To ensure efficient convection flow of water by separating the rising hot water from the descending cold water a baffle is provided. The boiler is surrounded by refractory material which prevents lateral or radial dissipation of heat, the material being provided with an opening, concentric with the block, for the reception of a gas burner.

Coke Handling.—No. 360,141.

TOOGOOD, H. J., and ROBERT DEMPSTER & SONS, LTD., both of Elland.

No. 29,198; Sept. 30, 1930.

This invention has for its object to produce a chute which will minimize the wear-and-tear of the coke in its passage into, through, and out of the bunker, and minimize the atmospheric dust of handling.

A channel or side trough of spiral formation is so disposed that:

(1) Its lower side forms a floor at a sufficient inclination to the horizontal for the incoming coke to gravitate gently and with minimum breakage into the bunker.

(2) Its vertical back or outer circumference of the spiral overcomes the centrifugal effect of the moving coke, and retains the descending coke on the inclined path.

(3) Its upper side forms a cover to support the superimposed stationary coke within the bunker above the inclined path so as to leave the path free for the descending coke.

(4) Its front, or open side, faces inwards to the vertical centre line or axis of the spiral formation.

(5) The diameter and pitch of the spiral in conjunction with the width of the trough are such that, while the inclination to the horizontal of the floor at its outer circumference or junction with the vertical back is approximately 40°, or sufficient for the coke to slide with minimum breakage and dust creation gently by gravity, the inner edges of the floor of the open trough are much steeper (say, 65°). Thus centrifugal force is necessary to retain the descending coke within the trough, and as soon as this ceases, the inner edges of the spiral trough being steeper than the angle of repose of coke (approximately 45°), the coke leaves the interior of the trough by gravity and distributes itself without any falling to cause breakage more uniformly at its natural angle of repose over the surface of the coke already lying at rest in the bunker. On the opening of the bottom outlet of any large bunker a small quantity (or vortex) of coke immediately above the outlet falls freely and without attrition. The extreme lower end of chute is so placed that it terminates completely within this vortex, and yet is free and at some appreciable distance from the bunker sides.

Water Heaters.—No. 360,155.

RADIATION, LTD., of Birmingham, and YATES, H. J., of 15, Grosvenor Place, London.

No. 30,501; Oct. 11, 1930.

In certain forms of water heating apparatus, a heater is combined with a storage tank, and to avoid an excessively rapid rate of circulation of water between the boiler and tank the practice has been adopted of providing in one of the circulation pipes a control device in the form of a restriction. It is found that this restriction is liable to become blocked by solids, and the object of the invention is to enable the blockage to be conveniently removed at any time without dismantling the apparatus.

The invention comprises a valve arranged to control a seating through which a free flow can be obtained, and a restricted orifice through which the normal flow occurs and which is not affected by the valve.

Diaries, Calendars, &c., Received.

Acknowledgment is made of the receipt from the following friends of seasonable gifts in the form of diaries, calendars, &c.:

Brotherton & Co., Ltd., City Chambers, Leeds.
Cambrian Wagon Company, Ltd., East Moors Road, Cardiff.
Davison & Partner, Ltd., 11, Carteret Street, Westminster, S.W. 1.
Dougall's Gas Meters, Ltd., Chiswick Mall, London, W. 4.
Gas Purification and Chemical Company, Ltd., Palmerston House, 34, Old Broad Street, London, E.C. 2.
Gibbons (Dudley), Ltd., and Gibbons Bros., Ltd., Dibdale Works, Dudley, Worcs.
William Guppy & Son, Ltd., 2 and 3, Eldon Street, London, E.C. 2.
Lunt Bros., Colemore Row, Birmingham.
R. & A. Main, Ltd., London and Falkirk.
Peckett & Sons, Ltd., Atlas Locomotive Works, Bristol.
E. C. Theedam, Ltd., Dudley.
United Steel Companies, Ltd., Sheffield.
Webb, Son, & Co., Ltd., Warwick House, 294, City Road, E.C. 1.

[For Market Reports, see p. 40.]

STOCK AND SHARE LIST.

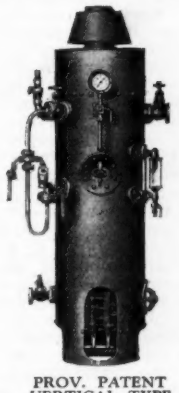
Official Quotations on the London and Provincial Stock Exchanges.

[For Stock Market Report, see later pages.]

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr.	Dividends. Last Hf. Yr.	NAME.	Quotations. Dec. 31. (Provincial Exchanges Dec. 31.)	Rise or Fall on Week.	Transactions. Lowest and Highest Prices During the Year 1931.
£			% p.a.	% p.a.				
1,551,868	Stk.	Oct. 5	7⅞	7⅞	Alliance & Dublin Ord. ...	100—105	...	100—107½
374,000	,,	July 9	4	4	Do. 4 p.c. Deb. ...	67—72	...	68⅝—76⅝
522,655	,,	Aug. 24	7	7	Barnet Ord. 7 p.c.	120—125	...	110—128½
300,000	1	Oct. 19	1/9⅜	1/4⅛	Bombay, Ltd.	15/—17/6	...	15/—18/9
174,500	10	Aug. 10	9	9	Bournemouth 5 p.c. ...	14⅜—15⅝	...	15—16
500,050	10	,,	7	7	Do. B 7 p.c. ...	12—13	...	12—18½
439,160	10	,,	6	6	Do. Pref. 6 p.c. ...	10½—11¼	...	10⅝—11⅜
50,000	Stk.	Dec. 14	3	3	Do. 3 p.c. Deb. ...	53—58†	...	60—63
162,025	,,	,,	4	4	Do. 4 p.c. Deb. ...	73—78†	...	80½—84
357,900	,,	Aug. 24	7½	7½	Brighton & Hove 6 p.c. Con.	114—119	...	107—117
371,880	,,	,,	6⅜	6⅜	Do. 5 p.c. Con.	104—107	...	103¾—107¾
1,287,500	,,	July 23	5	5	Bristol 5 p.c. max.	88—90a	...	g
120,420	,,	June 25	4	4	Do. 1st 4 p.c. Deb. ...	78—80a	...	g
217,870	,,	,,	4	4	Do. 2nd 4 p.c. Deb. ...	78—80a	...	g
328,790	,,	,,	5	5	Do. 5 p.c. Deb.	98½—99½a	...	g
855,000	,,	Oct. 5	8	7	British Ord.	108—113	...	108½—116
100,000	,,	June 25	7	7	Do. 7 p.c. Pref.	110—115	...	110—113⅜
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	70—75	...	73—78
450,000	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	92—97	...	93½—98
160,000	,,	June 25	5	5	Cambridge 5 p.c. Deb. ...	92—97	...	100—101½
100,000	10	Nov. 30	8	6	Cape Town, Ltd.	8¾—9¼	...	8⅞—10⅛
100,000	10	Oct. 30	4½	4½	Do. 4½ p.c. Pref. ...	6¼—7¼	...	6¼—7⅞
150,000	Stk.	June 25	4½	4½	Do. 4½ p.c. Deb. ...	65—70	...	65—70
626,860	,,	July 23	6	6	Cardiff Con. Ord.	95—98	...	95½—99½
237,860	,,	June 25	—	2⅜	Do. 5 p.c. Red. Deb.	90—95	...	...
157,150	,,	Aug. 10	6½	5	Chester 5 p.c. Ord.	87—92b	+1	88—90b
98,936	1	Oct. 5	12/-	2/-	Colombo, Ltd. Ord.... ...	27/—32/-	...	28/6—33/9
24,500	1	,,	1/4⅛	1/4⅛	Do. 7 p.c. Pref.	17/—19/-	...	...
609,204	1	Oct. 19	1/3'27	/10'90	Colonial Gas Assn. Ltd. Ord.	10/—15/-	...	7/6—18/-
296,053	1	,,	1/5'67	1/2'54	Do. 8 p.c. Pref.	10/—15/-	...	10/-
2,073,280	Stk.	July 23	6	6	Commercial Ord.	92—95	...	92—97½
475,000	,,	Dec. 14	3	3	Do. 3 p.c. Deb. ...	51—56†	...	52—59
787,560	,,	Aug. 10	7	7	Croydon sliding scale ...	107—110	...	107—112½
458,100	,,	,,	5	5	Do. max. div.	81—84	...	81—86
542,270	,,	Aug. 24	10	7	Derby Con.	120—125c	...	g
55,000	,,	June 25	4	4	Do. Deb.	65—70c	...	g
209,000	,,	Sept. 7	5	5	East Hull Ord. 5 p.c. ...	71—76	...	72—74
179,500	,,	Aug. 24	5½	5½	East Surrey Ord. 5 p.c. ...	86—91	...	...
155,019	,,	June 25	5	5	Do. 5 p.c. Deb. ...	90—95	...	...
1,002,180	,,	Sept. 21	16½	14	European, Ltd.	95—105	...	80—125
18,953,033	,,	July 23	5⅝	5⅝	Gas Light & Coke 4 p.c. Ord.	17/6—18/6/	...	17/6—20/9
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max. ...	53—58	...	53⅜—69
4,294,691	,,	,,	4	4	Do. 4 p.c. Con. Pref. ...	70—75	...	67—82½
5,694,095	,,	Dec. 14	3	3	Do. 3 p.c. Con. Deb. ...	52—57†	...	53½—66
3,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	93—98†	...	92—105½
2,500,000	,,	,,	—	4½	Do. 4½ p.c. Red. Deb. ...	84—89†	−1	84—99½
161,480	,,	Sept. 7	10	10	Harrogate Cons. 10 p.c. max.	157—162	...	157½—161
82,500	,,	Aug. 24	7	7	Hastings & St. L. 5 p.c. Conv.	95—100	...	97½—102
258,740	,,	,,	5½	5½	Do. 3½ p.c. Conv.	80—85	...	83—85
70,000	10	9 Oct. '30	½	10	Hongkong & China, Ltd. ...	12—13	...	12½—13⅝
213,200	Stk.	Aug. 10	6	6	Hornsey Con. 3½ p.c. ...	89—92	...	90—93½
2,800,000	,,	Oct. 30	25	15	Imperial Continental Cap.	310—330	...	290—373
223,130	,,	Aug. 10	3½	3½	Do. 3½ p.c. Red. Deb.	70—75	...	70—83
235,242	,,	Aug. 10	8½	8½	Lea Bridge 5 p.c. Ord. ...	129—132	...	124¾—130½
2,145,907	,,	Aug. 24	6	6	Liverpool 5 p.c. Ord. ...	96½—97½b	...	93¾—100⅞b
306,083	,,	July 15	4	4	Do. 4 p.c. Deb. ...	79—81b	...	81b
165,736	,,	Aug. 24	9	8	Maidstone 5 p.c. Cap. ...	123—128	...	123—133⅜
68,480	,,	June 25	3	3	Do. 3 p.c. Deb. ...	55—60	...	54—57½
75,000	5	Nov. 30	110	110	Malta & Mediterranean ...	6½—7	...	5⅝—7⅛
392,000	—	Oct. 1	5½	5½	Metropolitan (of Melbourne) 5½ p.c. Red. Deb.	78—83	...	83½—83
171,978	Stk.	Aug. 24	5	5	M. S. D. Utility "C." Cons.	76—81	...	76½—80½
522,992	,,	,,	4	4	Do. 4 p.c. Cons. Pref.	67—72	...	67—78½
675,000	,,	May 21	16	16	Montevideo, Ltd.	70—80	...	70—100
2,061,315	,,	Aug. 10	5⅜	5	Newcastle & Gateshead Con.	16/—17/-d/	+·/3	g
682,856	,,	,,	4	4	Do. 4 p.c. Pref. ...	68—70d	...	g
691,705	,,	June 25	3½	3½	Do. 3½ p.c. Deb. ...	69—71d	...	g
277,285	,,	Oct. 30	5	5	Do. 5 p.c. Red. Deb.	96—98d	...	g
199,940	,,	Aug. 24	7½	7½	North Middlesex 6 p.c. Con.	105—110	...	106—119½
396,160	,,	Aug. 10	5	5	Northampton 5 p.c. max. ...	74—79	...	76—76½
300,000	,,	Nov. 30	7	9	Oriental, Ltd.	88—98	...	89—108½
60,000	5	13 May, '15	—	—	Ottoman	0—¼	...	...
205,162	Stk.	June 25	8	8	Plym'th & Stonehouse 5 p.c.	110—115	...	111—112½
424,416	,,	Aug. 24	8	8	Portsm'th Con. Stk. 4 p.c. Std.	119—124	...	119—127
241,446	,,	,,	5	5	Do. 5 p.c. max. ...	76—79	...	79—80
686,312	,,	July 23	4	4	Primitiva 4 p.c. Rd. Db. 1911	83—86	...	83½—86½
389,813	,,	June 25	4	4	Do. 4 p.c. Cons. Deb.	84—87	...	84½—87½
150,000	10	Sept. 21	6	6	San Paulo 6 p.c. Pref. ...	7¾—8	...	7⅝—8 1/16
1,736,968	Stk.	Sept. 7	6½	6	Sheffield Cons.	103—105e	...	g
96,000	,,	July 9	4	4	Do. 4 p.c. Deb.	79—81e	...	g
133,201	,,	Sept. 7	5	8½	Shrewsbury 5 p.c. Ord. ...	85—90	...	75
90,000	10	June 11	15	15	South African	3½—5¾	...	3½—5⅝
6,709,895	Stk.	July 23	7½	5	South Met. Ord.	96—99	...	96—108
1,135,312	,,	,,	6	6	Do. 6 p.c. Irred. Pf.	103—108	...	100—116½
1,895,445	,,	July 9	3	3	Do. 3 p.c. Deb. ...	53—58	...	54½—65⅝
1,000,000	,,	July 23	4	5	Do. 5 p.c. Red. Deb.	93—99	...	9.—104
91,500	,,	Aug. 10	8½	8½	South Shields Con.	108—110d	...	g
1,548,795	,,	Aug. 10	6½	6½	South Suburban Ord. 5 p.c.	101—104	...	101—105½
668,837	,,	June 25	5	5	Do. 5 p.c. Deb.	92—97	...	92—103
647,740	,,	Aug. 24	5	5	Southampt'n Ord. 5 p.c. max.	76—79	...	73½—80
121,375	,,	June 25	4	4	Do. 4 p.c. Deb.	70—75	...	76—78
250,000	,,	Aug. 24	7	7	Swansea 7 p.c. Red. Pref. ...	96—99	...	96 99
200,000	,,	June 25	6½	6½	Do. 6½ p.c. Red. Deb.	99—102	...	100—102
1,076,490	,,	Aug. 10	6⅝	6⅝	Tottenham and District Ord.	103—107	...	102—107
150,000	,,	,,	5⅝	5⅝	Do. 5⅝ p.c. Pref. ...	93—98	...	100—105½
199,005	,,	Dec. 14	4	4	Do. 4 p.c. Deb. ...	68—73†	...	73—79⅞
85,701	,,	Sept. 21	6	6	Tuscan, Ltd., 6 p.c. Red. Db.	72—77	...	75—78
310,694	,,	Aug. 24	7	7	Uxbridge, Maidenhead, & Wycombe 5 p.c.	100—105	...	95½—107
88,330	,,	,,	5	5	Do. 5 p.c. Pref. ...	85—90	...	89—94½
1,322,220	,,	July 9	7	7	Wandsworth and District: Consolidated	110—114	...	110½—116
971,373	,,	,,	5	5	Do. 5 p.c. Pref.	90—95	...	91—100
1,167,964	,,	June 25	5	5	Do. 5 p.c. Deb.	92—97	−2	92½—103

Quotations at:—*a.*—Bristol. *b.*—Liverpool. *c.*—Nottingham. *d.*—Newcastle. *e.*—Sheffield. *f.*—The quotation is per £1 of stock. *g*—Figures unobtainable. * Ex. div. † Paid free of income-tax. ‡ For year. § Div. = 10 p.c. p.a. less tax and less tax on interim dividend.

KIRKE
GAS-FIRED
BOILERS
SUPERHEATERS
& WATER HEATERS



PROV. PATENT
VERTICAL TYPE
HORIZONTAL TYPE AVAILABLE

1 THERM WILL GENERATE 78 POUNDS OF STEAM FROM AND AT 212° F.

1 THERM WILL GENERATE 76,000 B.T.U.'S

1. Thermal Efficiency 85 per cent. on net calorific value of the gas.
2. The quickest steam raiser on the market.
3. Cheap in First Cost.
4. Minimum floor space.
5. No backfiring.
6. Heat generated and extracted within tubes.
7. Minimum Maintenance costs.
8. No chimney required.
9. No soot formation.

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GAS MARKETS & MANUFACTURES

Stock Market Report.

[For Stock and Share List, see earlier page.]

For the second week in succession the Stock Exchange was closed on Friday and Saturday, and during the four days of business last week the number of transactions was very restricted. Prices in most sections continued unchanged, though gilt-edged securities showed a tendency to harden. It is evident that investors in increasing numbers are curtailing their commitments until international affairs show some definite signs of straightening out, and the result of the conference of the European Governments on Reparations and War Debts (to be held at Lausanne on Jan. 19) is awaited with interest.

The Gas Market was no exception to the general rule, and the volume of business was on a very small scale. Only four quotations were affected—viz., Chester ordinary (on the Liverpool Exchange) with a rise of 1 point to 89½, and Newcastle £1 units which closed at 3d. higher (on the local Exchange) at 16s. 6d., while Gas Light 4½ p.ct. debenture and Wandsworth 5 p.ct. debenture dropped 1 and 2 points respectively.

In accordance with the practice of former years, the prices of the lowest and highest recorded transactions during the past year have been inserted in the Stock and Share List. A comparison of these figures with those published for 1930 reveals the fact that the highest prices last year in nearly all cases exceeded those for 1930, in some instances by a considerable margin; while in spite of the financial vicissitudes of 1931 the lowest prices of a number of ordinary issues were above the previous year's worst. Preference and debenture stocks suffered most, though a part of the rather unnecessarily drastic marking down in September last has now been recovered.

A further addition has been made this week to the Stock and Share List by the inclusion of the East Surrey Gas Company's ordinary and 5 p.ct. debenture stocks. A dividend of 5½ p.ct. per annum has been distributed on the ordinary stock for the past four years, while the interim dividend last year was increased by ¼ p.ct.; and if this rate (5¾ p.ct.) is maintained for the full year the yield at the current price works out at nearly 6½ p.ct. The growth of the Company's business has been phenomenal, for since 1923 the sales of gas have increased by no less than 70 p.ct., while in 1930, an unfavourable year for many companies by reason of climatic conditions, an increase of 1·55 p.ct. over 1929 was recorded.

Current Sales of Gas Products.

The London Market for Tar and Tar Products.

LONDON, *Jan.* 4.

The values of tar products are as follows:

Stocks of pitch are much reduced, and makers are conservative in selling. The price is firm at not below 75s. per ton f.o.b.

Creosote, for export, varies from 3¾d. to 5d. per gallon f.o.b., according to specification.

Pure toluole is firm at about 2s. 7d. to 2s. 8d. per gallon; pure benzole is 1s. 8d. to 1s. 9d. per gallon, 95/160 solvent naphtha about 1s. 6d. per gallon, and 90/140 pyridine bases about 4s. per gallon.

Tar Products in the Provinces.

Jan. 4.

The average prices of gas-works products during the week were: Gas-works tar, 27s. to 31s. Pitch—East Coast, 60s. to 65s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 60s. to 65s. f.o.b.* Toluole, naked, North, 1s. 10½d. to 1s. 11d. Coal-tar crude naphtha, in bulk, North, 5d. to 5¼d. Solvent naphtha, naked, North, 1s. 3d. to 1s. 3½d. Heavy naphtha, North, 11d. to 11¼d. Creosote, *ex* works, in bulk, North, liquid and salty, 3½d. to 3¾d.; low gravity, 1¼d.; Scotland, 3½d. to 3¾d. Heavy oils, in bulk, North, 5d. to 5½d. Carbolic acid, 60's, 1s. 7½d. to 1s. 8d. Naphthalene, £9 to £10. Salts, 55s. to 75s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *Jan.* 2.

Business is now at a standstill as works are closed for a long week-end. Meantime quotations remain steady in most departments.

Pitch.—Stocks are low and available supplies command 60s. to 65s. per ton *ex* works in bulk. Export price is nominal at round 65s. per ton f.o.b. Glasgow.

Refined tar to Ministry of Transport Specification continues firm in tone with quotations at 4d. to 4½d. per gallon ex works naked.

Creosote oil.—This market is steady with supplies on the short side at present. B.E.S.A. Specification is 3d. to 3¼d. per gallon; low gravity, 3¼d. to 3¾d. per gallon; and neutral oil, 3½d. to 3¾d. per gallon—all f.o.r. works in buyers' tanks.

Cresylic.—No change can be reported, there being few inquiries and fair supplies available. Pale, 97/99 p.ct., 1s. 2½d. to 1s. 3½d. per gallon; dark, 97/99 p.ct., 1s. 1½d. to 1s. 2½d. per gallon; and pale, 99/100 p.ct., 1s. 4½d. to 1s. 5d. per gallon—all *ex* works.

Crude naphtha is quiet at 4½d. to 5d. per gallon f.o.r. works.

Solvent naphtha.—Few orders are on hand and prices are easy. 90/160 grade is 1s. 3d. to 1s. 4d. per gallon, and 90/190 grade 1s. to 1s. 1d. per gallon.

Motor benzole is unchanged at 1s. 3d. to 1s. 4d. per gallon f.o.r. makers' works in bulk quantities.

Pyridines.—90/160 grade is 3s. to 3s. 3d. per gallon, and 90/140 grade 3s. 3d. to 3s. 6d. per gallon.

Benzole Prices.

These are considered to be the market prices for benzole at the present time:

	s.	d.		s.	d.	
Crude benzole	0	7	to	0	7½	per gallon at works
Motor ,, ...	1	2	,,	1	3	,, ,, ,,
Pure ,, ...	1	6	,,	1	7	,, ,, ,,

Trade Notes.

Messrs. Babcock & Wilcox, Ltd.

The above firm wish us to announce that their Contract Drawing Offices, which have hitherto been located in the London Office (Babcock House, Farringdon Street, E.C. 4), have, from Jan. 1, been transferred to their Renfrew Works. The Designing Department still remains in London.

Hamworthy Air Compressors.

Hamworthy air compressors are British made, and the Ford engine is now manufactured at the new Dagenham Works, so the combination is an entirely British petrol driven portable compressor of outstanding merit. Full particulars of the set are given in a list recently issued by the firm (No. 835), and the compressor is specially designed for direct coupling to the well-known Ford Model "A" engine. These portable compressors give great satisfaction under actual working conditions in road making, constructional work, and other purposes.

A Large Repeat Order for Calorimeters.

The Cambridge Instrument Company, Ltd., of 45, Grosvenor Place, S.W. 1, have recently received from the Gas Light and Coke Company an order for three Thomas gas calorimeters to be installed at the Battersea, Cross Lane, and Richmond Testing Stations. This important order has been placed after considerable experience of the working of these calorimeters, fifteen having been installed some time ago at the Beckton Works of the same Company, which also has Thomas calorimeters at Fulham, Bow Common, Nine Elms, and Watson House. It is a high tribute to the efficiency of these instruments that the largest Gas Company in this country, after the fullest opportunity of testing and observing their working, should employ them so extensively.

Gas Acts (1920 and 1929) Orders.

SPECIAL ORDERS.

Cambridge University and Town Gas Light Company.

To transfer and vest in the Company the lands, gas-works, mains, pipes, lamp columns, lanterns, appliances, and other works and apparatus now or formerly belonging to the New Cottenham Gas and Water Company, Ltd., and transferred or to be transferred by the Cottenham Company to the Chesterton Rural District Council; to authorize the Company to continue, maintain, and use the said works and apparatus; and to confirm and give effect to any agreement which may be or have been entered into between the Company and the Council with regard to these matters.

PUBLISHERS' NOTICE.

TO CORRESPONDENTS: No notice can be taken of anonymous communications, unless authenticated by the name and address of the writer (not necessarily for publication).

TO ADVERTISERS.

NOON ON TUESDAY is the latest hour for receipt of advertisement copy for the following day's issue.

FIRST POST ON MONDAY is the latest for receipt of alterations of standing advertisements.

RATES FOR UNDISPLAYED ADVERTS: Situations Wanted, Six Lines and under (about 36 words), 3s.; each additional Line, 6d. Situations Vacant, Apparatus Wanted and for Sale, Contracts, Public Notices, &c., 9d. per Line—minimum 4s. 6d. An additional charge of 6d. is made where replies are addressed c/o the "JOURNAL."

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Other Countries in the Postal Union.		40/- per annum, in advance.

A copy of the "G.J." Calendar and Directory is presented to Continuous Subscribers.

Subscribers who desire to avail themselves of the reduction in the Subscription by paying in advance for the current Year are reminded that this can only be done up to the end of January.

UNITED STATES.—Renewals after December, 1931, and all new subscriptions in the United States, to be made through ROBERT O. LUQUEER, Agent, WOOLWORTH BUILDING, NEW YORK, N.Y.

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Further information may be had from THE REGISTRAR, THE UNIVERSITY, LEEDS.

COMPANY NOTICE.

THE GAS LIGHT AND COKE COMPANY.

NOTICE is Hereby Given that the TRANSFER BOOKS of this Company, SO FAR AS THEY RELATE TO CAPITAL STOCKS, WILL BE CLOSED at 4 o'clock p.m. on Tuesday, the 12th day of January next, and will be RE-OPENED immediately after the Ordinary General Meeting of the Company to be held on Friday, the 12th day of February next.

Dividends payable in respect of the Half-Year ending the 31st inst. will be remitted by Warrant forwarded by post on the 29th of February, 1932, to those Proprietors who were the Holders of Capital Stocks when the Transfer Books were closed, or their Authorized Agents.

By order,
WILLIAM LYLE GALBRAITH,
Secretary.

Chief Office:
Horseferry Road,
Westminster, S.W. 1,
Dec. 30, 1931.

COMMERCIAL GAS COMPANY.

NOTICE is Hereby Given that an ORDINARY MEETING of the Commercial Gas Company will be holden at Southern House, Cannon Street Station, in the City of London, on Thursday, the 11th of February, 1932, at Twelve o'clock noon:

To receive the Directors' Report and the Accounts of the Company for the Year ended the 31st of December, 1931.
To declare a Dividend for the Half-Year ended the 31st of December, 1931.
To elect Directors and an Auditor in the place of those retiring.

The Proprietors will also be asked to consider and approve a proposal to vary the details of the Scheme for the election of Employees' Directors made under the provisions of the Commercial Gas Act, 1927.

The STOCK TRANSFER BOOKS WILL BE CLOSED from the 12th of January to the 11th of February next, both days inclusive; and the Dividends will be paid on the 15th of February next to the holders of Stock registered at the date of the closing.

NOTICE IS HEREBY ALSO GIVEN that an EXTRAORDINARY MEETING of the said Company will be held at the same place and on the same day at 12.30 o'clock in the afternoon (or so soon thereafter as the business of the said Ordinary Meeting shall have been concluded) for the purpose of submitting to the Proprietors, for their consideration and approval, the provisions of the Bill now before Parliament intituled "A Bill to confer further powers on the Commercial Gas Company, and for other purposes."

By order of the Board,
F. J. BRADFIELD,
General Manager and Secretary.

Offices,
Stepney,
Jan. 4, 1932.

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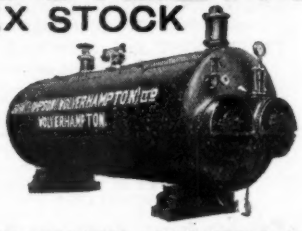

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THE CHAIRMAN,
SCHOOL FOR THE BLIND
(Founded 1838).
Swiss Cottage, LONDON, N.W.3

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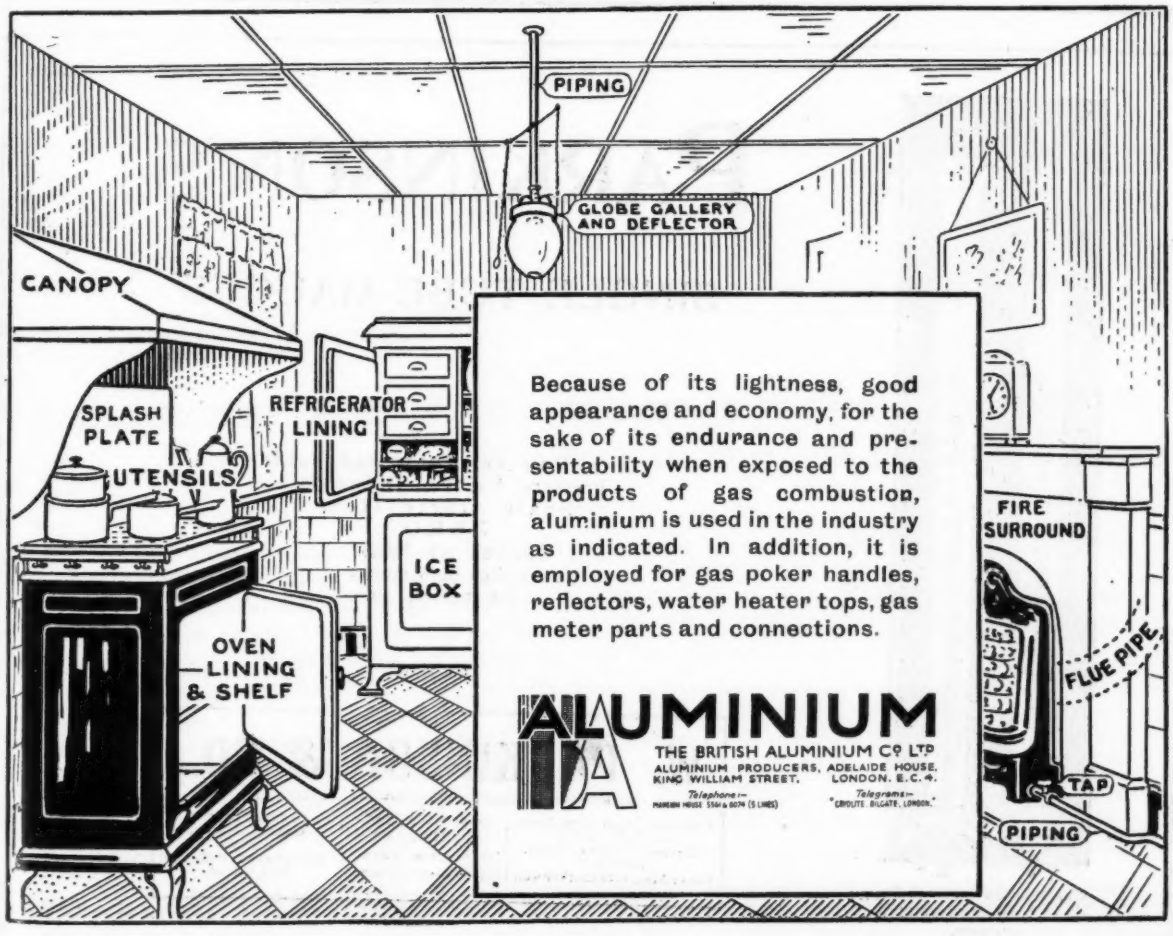
Current Sales of Gas Products 100

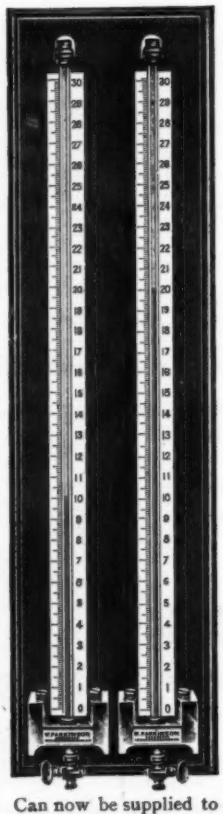
Stock and Share List 101


PIPING
GLOBE GALLERY AND DEFLECTOR
CANOPY
SPLASH PLATE
UTENSILS
REFRIGERATOR LINING
ICE BOX
OVEN LINING & SHELF
FIRE SURROUND
FLUE PIPE
TAP
PIPING
Because of its lightness, good appearance and economy, for the sake of its endurance and presentability when exposed to the products of gas combustion, aluminium is used in the industry as indicated. In addition, it is employed for gas poker handles, reflectors, water heater tops, gas meter parts and connections.
ALUMINIUM
THE BRITISH ALUMINIUM Co LTD
ALUMINIUM PRODUCERS, KING WILLIAM STREET.
ADELAIDE HOUSE, LONDON. E.C.4.

Empire Products

The most vital parts of a meter are its leathers, and upon their quality depends the service of the meter. The best meter leathers are Empire produce and the Empire is combed to provide the Thomas Glover quality. Only one quality can be used, and that is the best.

THOMAS GLOVER & CO. LTD.
Original Dry Meter Makers : Established in 1844.
Gothic Works : EDMONTON. LONDON N18. & Branches.



Can now be supplied to show both pressure and vacuum.

PARKINSON'S

SINGLE TUBE GAUGES

One Pattern, Interchangeable
Pressure, Vacuum, Differential.
Scale starts from
ZERO
Inches of Water
Inches of Mercury
lbs. per sq. in.

W. PARKINSON & CO.,
INCORPORATED IN PARKINSON & COWAN (GAS METERS), LTD.

COTTAGE LANE, CITY ROAD, LONDON, E.C.1.	BELL BARN ROAD, BIRMINGHAM.	RAPHAEL STREET, CROMAC STREET, BELFAST.
Telegrams: "INDEX, 'PHONE, LONDON."	"GASMETERS, B'HAM."	"PREPAYMENT, BELFAST."
'Phone Nos.: 4270 Clerkenwell	2245 Midland, B'ham.	3374 Belfast.